THE FARMERS' REGISTER.

VOL. VII. JULY 31, 1839. No. 7.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

REMARKS ON THE VEGETABLE KINGDOM.

[Continued from page 376.]

Plants, from what has been said, are organized bodies, and, like animals, capable of begetting their like, and continuing their species; each kingdom having male and female organs of reproduction. The first and most important account we have of the vegetable kingdom is recorded by Moses, in the 1st chapter of Genesis, 11 and 12 verses. "And God said let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit, after his kind, whose seed is in itself, upon the earth: and it was so. And the earth brought forth grass, and the herb yielding seed after his kind, and the tree yielding fruit, whose seed was in itself after his kind: and God saw that it was good." I infer from the passages just read, that the seeds of plants were organized in miniature, and when evolved required the vivifying influence, or male dust, to render them fruitful. The inspired writer does not say the principles or component parts, that form seeds, were given; he states positively and explicitly "whose seed is in itself." I take the passage then as it is written, in its plain literal sense, and will not trouble myself about vain theories of the schools, respecting the fructification of plants and the generation of animals. If man may be permitted to raise the veil and explore the hidden laws of nature within, I too, have written and published to the world, a speculative theory on "Generation," entitled perhaps to some credit for its plausibility; yet, I must publicly acknowledge that it stands on medical record, an effusion of vanity and presumption. The seeds of both kingdoms were given by the all-wise creator, and it never was intended that man, a worm born and nourished in sin, should understand such divine mysteries.

The most simple form of organic matter, was first brought into being; for it seems from the Mosaic narrative, that the earth's surface was clothed with vegetation before any mention is made of the animal kingdom; and the most remarkable circumstance in the two verses read, is that God gave to each class, order, genera, and species, its like in miniature, viz., he gave to each plant, herb, &c., seeds, for the purpose of their reproduction and continuance. It would appear from this account, that primitive vegetation, or that kind of vegetation spoken of by Moses, was not of sexual origin, but the immediate work of God. Unless it be admitted that our planet, six thousand years ago, was the ruins of a former world, having seeds promiscuously deposited in its chaotic mass; and when renovated and reduced to order the necessary agents acted on its surface and produced germination. Some philosophers of the present day are inclined to this opinion, and think it consistent with the cosmogony of Moses: they say there are many circumstances which favor such an opinion. The infant sciences of fossil botany, and fossil osteology, are bringing daily to our view the remains of fossil vegetable and animal relics, imbedded in carboniferous and chalk formations, that come under no known order, genera or species, and are unknown to the botanists and anatomists of the present day. Hence it is concluded, that they had an existence long before the Mosaic history, and are fossil remains of a former world; or the remains of this world, before it was last renovated and fitted up for the reception of the present organic race. The science of geology has already proved that the surface of our planet has not existed in its present form from eternity; but has been revolutionized, in passing through many series of creative operations, succeeding each other at long intervals of time. Primitive and secondary formations contain fossil organic remains, both of the vegetable and animal kingdoms, differing in structure from organic remains of the present day. The microscope brings to view vegetable and animal organic remains, from the greatest depths ever reached by the art of man, or currents of water. From this circumstance we must infer, that the earths surface has not only been broken up and dissolved, but its whole mass agitated and convulsed by terrible events. The Rev'd. William Buckland, D. D. in his Bridgewater Treatise on geology and mineralogy, vol. 1st, page 390, says, "the number of fossil plants as yet described is about 500; nearly 300 of these are from strata of the transition series, and almost entirely from the coal formation. About 100 are from strata of the secondary series, and more than 100 from the tertiary series. Many additional species have been collected from each of these series, but are not yet named. As the known species of vegetables are more than fifty thousand, and the study of fossil botany is as yet but in its infancy, it is probable that a large amount of fossil species lies hid in the bowels of the earth, which the discoveries of each passing year will be continually bringing to light." In giving an account of the coal mines in Bohemia he says, "the most elaborate imitations of living foliage upon the painted ceilings of Italian palaces, bear no comparison with the beautious profusion of extinct vegetable forms with which the galleries of these instructive coal mines are over-hung. The roof is covered as with a canopy of gorgeous tapestry, enriched with festoons of most graceful foliage, flung in wild irregular profusion over every part of its surface. The effect is heightened by the contrast of the coal black color of these vegetables with the light ground work of the rock to which they are attached. The spectator feels himself transported as by enchantment into the forests of another world; he beholds trees of forms and characters now unknown upon the surface of the earth, presented to his senses almost in the beauty and vigor of their primeval life; their scaly stems and bending branches, with their delicate apparatus of foliage are all spread forth before him; little impaired by the lapse of countless ages, and bearing faithful records of extinct systems of vegetation, which began and terminated in times of which these relics are the infallible historians."

"Such are the grand natural herbaria, wherein these most ancient remains of the vegetable kingdom are preserved in a state of integrity, little short of their living perfection under circumstances of our planet which exist no more. Lindley and Hutton, state, '*Fossil Flora*,' page 16, "that it is the beds of shale or argillaceous schistus which afford the most abundant supply of these ancient relics of a former world; the fine particles of which they are composed having sealed up and retained in wonderful preservation and beauty the most delicate forms of the vegetable organic structure." From these quotations, and many others that might be brought forward, our planet probably had an existence before the Mosaic account of the creation. And hence it is that geological research has, until within a few years past, been considered hostile to revealed religion. But I am inclined to the belief, that when the science of geology is properly understood, it will be calculated to give us the most exalted conceptions of the wisdom, power, and goodness of God. Geology has already thrown much light on many parts of Mosaic history, and in a few years it will be considered one of the most popular branches of science taught in the schools. "If I understand geology aright" (says Professor Hitchcock), "so far from teaching the eternity of the world, it prove more directly than any other science can, that its revolutions and races of inhabitants had a commencement, and that it contains within itself, the chemical energies, which need only be set at liberty by the will of their creator, to accomplish its destruction. Because this science teaches that the revolutions of nature have occupied immense periods of time, it does not, therefore, teach that they form an eternal series It only enlarges our conceptions of the deity; and when men shall cease to regard geology with jealousy and narrow minded prejudices, they will find that it opens fields of research and contemplation as wide and as grand as astronomy itself."

As soon as chaos was reduced to order, and the waters separated from the earth, Gen. 1st. 9, 10, God clothed and beautified the land with vegetation. Whether the whole or a part of the dry surface was clothed in vegetation at that time, seems hard to tell; the inspired writer merely states the fact, and says, "let the earth bring forth grass, the herb yielding seed, &c.:" the probability is, that only a small part of the ancient continent was at that time raised from the water to be decked with grass, herbs, &c., for the wants and support of the animal kingdom which was to follow. According to botanists, the entire number of known species of plants, now existing on the surface of the globe are 55,000; and they have divided the 55,000 species in 24 classes, according to their numbers, connections and stations of the male and female organs. The 24 classes, owe their distinctions to the stamens or male organs; and the sub-divisions of the 24 classes, are marked by the number of pistils or female organs.

If all vegetable seeds that have been formed on the earth in the last six thousand years, could have multiplied their species, unmolested and undiminished, and each plant retain its organization entire, together with the various crops of vegetation that have adorned this earth, the mass would in all probability so far exceed that of the tobacco and spleen-wort, as to fill the orbit of this earth.

I will now conclude with a few remarks on the fossil remains of vegetables.

The former races of vegetation that have beautified this earth for many thousand years, have passed away; except that portion the all-wise creator locked up in the bowels of the earth for the future use of man. We have reason to believe, immense forests have been heaped together in large masses, by violent convulsions of our planet, and transported to the bottom of ancient seas; and after being submerged and carbonized for ages, they were belched up by subterraneous fires, and elevated to the tops of lofty mountains, in the form of mineral coal. That coal is of vegetable origin, I infer: 1st, from the presence of terrestrial and marine plants in coalmines. 2ndly, when pit coal is seen through a microscope it is found to contain organic remains of wood, bark, leaves, and even the seeds of plants. 3rdly, the skeleton of plants are frequently found after burning coal in a furnace. "It is evidently seen, by the nature of the mountains which contain coal, that their formation has been submarine; for they all consist either of schistus, or grit, or lime-stone." These beds of fossil vegetable remains are now becoming the richest treasures of man, infinitely more valuable to him than silver and gold. They employ the labor and attention of a large portion of the human family at this time, and are daily becoming more and more interesting. The combustion of coal is substituted for manual labor throughout the whole civilized world; the surface of the earth is to be broken up and cultivated by the combustion of this vegetable mineral, and it will be the support of future generations. The great use of coal in administering to our wants, ought to interest every individual; we are deriving light and heat from fossil vegetation, that perhaps clothed this earth before its present surface had an existence. These primeval vegetables have not, like modern vegetation, undergone decay in yielding their elemental principles back to the atmosphere which nourished and gave them being; but are treasured up in subterranean beds and have become carbonized masses of coal, which, in the present age of the world, are to man sources of industry and wealth. The city of London consumes five tons of coal per minute, 300 tons per hour, 7.200 tons per day, 216,000 tons per month, or 2,628,000 tons per year: which, at 12½ cents per hundred pounds, will amount to the enormous sum of $6,570,000 per annum; and its consumption in Great Britain and on the continent is beyond calculation. All the mechanical powers, the lever, the wedge, the screw, the wheel and axle, and the inclined plane, are in active motion, and made subservient to the arts, by the expansive force of this useful mineral. The combustion of coal is found at the bottom of the mines, in the work shops of the trades and family dwellings; on the ocean and all navigable waters; on rail-roads and public highways; it lights up our cities, towns, and villages, increases population, begets riches, wealth and power, and dispenses light, warmth and comfort equally to the king and the peasant. It is the grand auxiliary in the arts, agriculture, commerce, manufactures, navigation and trade; and is daily and hourly administering innumerable blessings to the human race. What I might ask, would be the situation of England, without the fossil remains of vegetables? Her astonishing manufacturing machinery,

with a copital of 700,000,000 dollars, could not be kept in motion without it; could her 20,000 steam engines, that are continually cutting, splitting, sawing, hammering, filing, polishing, twisting, screwing, pumping, rowing, propelling, depressing, excavating, winding, weaving, carding, spinning, and a thousand other operations be carried on from her forests, unassisted by mineral coal? I should suppose not; for it would require half the population of this globe, to move the various complex machinery of England, with the same force and effect that is produced by the combustion of coals. "The amount of work done by machinery in England, has been supposed to be equivalent to that of between three and four hundred millions of men by direct labor, and we are astounded at the influence of coal and iron and steam upon the fate and fortunes of the human race."

Sir J. F. W. Herschel, in his Treatise on Natural Philosophy, page 59, says, "it is well known to modern engineers, that there is virtue in a bushel of coals properly consumed to raise 70 millions pounds weight. This is actually the average effect of an engine at this moment working in Cornwall." Again he says, the ascent of Mont Blanc, is the most toilsome feat that a strong man can execute in two days. The combustion of two pounds of coal will place him on the summit." It is now ascertained by the most experienced engineers of Europe, that the combustion of one bushel of coals well consumed, will raise 100,000,000 pounds weight, which would require the force or united exertion of one million of laborers, supposing each laborer lifted from the earth 100 pounds. Let us suppose one bushel of coal weighs 100 pounds, according to this estimate, one pound of coals properly consumed will raise one million pounds weight, which would require the direct labor of ten thousand men, or the combined strength and effort of the whole population of Cumberland county, each individual lifting as before. If this calculation be continued, we shall find that one ounce of coal in a state of combustion will raise 62,500 lbs. weight, which would require the direct labor of 625 men lifting 100 lbs. each. Marvel not at this, for we all know that the expansive force of a few thimbles full of confined power, will burst a gun barrel of the best temper, and rend in fragments the hardest rock of many tons weight. The United States has in store immense fields of this mineral; it is found at the head of tide water, and on the tops of her lofty mountains; there is throughout the union, and I might say throughout the whole world, proofs of design in the various dispositions of carboniferous beds; they are invariably found in situations most favorable for the comfort and convenience of man. On all our navigable rivers, we have beds of coal, ready for combustion or transportation. Iron, copper, lead, zinc, silver and gold, are treasured up in the vicinity of coal fields, ready to be fused and moulded by the hand of the artist. Wherever the forest is wanting, bountiful nature has, at hand, a substitute in coals; and mountains of this mineral are found in connection with our salt springs. We have then abundant reason to be thankful to the wise creator of the universe for such singular blessings.

In our own state these vegetable fossil remains are invaluable; from the falls of the Kanawha river to its junction with the Ohio, a distance of 100 miles or more, salt springs are found; and here in a chain of mountains following the meanders of this stream, we have the most remarkable accumulations of this vegetable production, within a few rods of the salt works, ready for combustion. In connection with these mountains of coal and fountains of salt water, are inexhaustable beds of iron ore, to be fused and wrought in pump rods, or cast in boilers for the purpose of making salt. Here then, gentlemen, is an astonishing instance of wonderful design in this single group of mineral resources. When the James river and Kanawha improvement is completed, Richmond will probably become a large manufacturing city; her water power is unequalled; she has the advantage in being surrounded and supported by extensive coal fields; her fires are now consuming this fossil, from which she prepares her food, and maintains her forges and furnaces; lamps in a few years, will illume her streets and public halls, from gas derived from coal, that has been buried in the dark recesses of the romantic hills of Powhatan, from time immemorial: together with these advantages, she will daily receive supplies of salt, lime, iron, copper, lead, and other mineral treasures through the western mountains. Her machinery will be propelled by coal combustion and water power, and at some future day she is destined to become the Birmingham of America—a wealthy manufacturing emporium, whose steam engines and water-works, will give employment to mechanics of the various trades; and the sound of the bell, the file and the loom, will be heard in the streets and dissipate gloom. "The smith also sitting by the anvil, and considering the iron work, the vapor of the fire wasteth his flesh, and he fighteth with the heat of the furnace; the noise of the hammer and the anvil is ever in his ears, and his eyes look still upon the pattern of the thing that he maketh; he setteth his mind to finish his work, and watcheth to polish it perfectly." We shall have abundant use for coals, the United States has become a wealthy powerful republic, extending from ocean to ocean, between two and three thousand miles in length, her population hourly in reasing, her numerous rivers, long and wide, her lakes large, and sea coast extensive. Her waters are navigated by steam engines, and if we add to these, the steam engines on her railroads, and those employed in the mines and various joint-stock, and other laboring departments, we shall find that they will require a great demand on our coal fields. If steam engines, for one hundred years to come, should increase in the same ratio they have in the last thirty years, there will be in the United States, and on her waters, almost a countless number; and although the western forest is wide and extensive, these engines must ultimately be fed and propelled by coal combustion. The Old Dominion, the mother of this great republic, has partly exhausted her forest, and coal is supplying its place. Let us then, if we regard future generations, hold fast the fossil remains of vegetables, husband our resources, and have legislative enactments prohibiting the exportation of coals, which we all regard as sources of heat and light and industry and wealth.

This earth is to be destroyed by fire, and if I am permitted to offer a single conjecture on this awful subject, it would be, that the most combustible matters will first become the immediate agents

of destruction. And whenever the wise creator thinks proper to bring about such an event, how easy will it be for him to set free latent heat, and let loose other chemical agents treasured up in coal fields and all combustible matters, in order to produce general conflagration, that will consume this earth and its furniture, and cause it to pass away like a downy feather in a furnace!

RALEIGH AND GASTON RAIL-ROAD.

Extract from the late annual Report.

The calculations of the entire cost of the work have been carefully made, taking the sums actually paid for such parts of it as have been completed and settled for, and the most accurate estimate that can now be had of the parts remaining to be done. It appears from these calculations, that the work will be done within the estimate of $1,215,000 given in my last report. I therefore refer you to that as the sum which will not be materially exceeded, if at all. This sum exceeds the capital with which the company was originally incorporated, which was $800,000, with the privilege of increasing to $1,000,000. I cannot feel surprised at this excess of the actual cost over a conjectural estimate, made before any survey of the route, and based on data quite vague and inaccurate. Even if an accurate estimate had been made, the rise in prices which occured about the period of the commencement of this work, and which has most unexpectedly continued to the present time, would have been sufficient to account for a great increase of cost.

A comparison of the cost of this work, with the actual cost of the rail-roads in the same range of country in the state of Virginia, and with many roads at the north, will satisfy any inquirer, that it has not exceeded what was justly to be anticipated from the character of the country passed over. I will instance the Richmond and Fredericksburg Rail-Road, both because it approaches nearest to this in character, and because no one at all acquainted with the management of that road, while constructing, has ever doubted that the strictest economy was used. That road cost $12,900 per mile, exclusive of bridging and of locomotives and cars, which is $360 per mile more than the cost of yours, with the same exceptions. The cost of the Richmond and Petersburg road, exclusive of bridges, cars, &c. has been about $21,444 per mile, or $8,904 per mile, more than yours.

The cost of the Petersburg rail-road (not including the Greensville branch, which was much more expensive) with the same exception of bridges, cars and locomotives, has been about $9,700 per mile. This last will be perceived to be $2,840 per mile less than the cost of the Raleigh and Gaston road. This difference is fully accounted for by the circumstances of the case. Labor was hired during the construction of that road at an average price of about $70 per annum; bacon was at 7 to 8 cents, beef at 2 to 4 cents, and corn at 40 to 50 cents per bushel. Rail timber in that section of country is much more abundant than it is on your road, and consequently, could be gotten for about 20 per cent. less. The iron for the Petersburg road cost about $47 per ton, delivered in Petersburg, while that for your road costs about $70 per ton, delivered at Gaston.

Thus it will be perceived that all the elements of cost were, at that time, far less than they have been during the construction of this road.

These are certainly comparisons by no means unfavorable to your work, and when we add that yours is the only one of the roads mentioned, in which rock excavation was encountered to any extent, and the difficulties to be overcome by excavations and embankments are far more considerable than on the cheapest of these other roads, and nearly as great as on the most expensive, it is believed that the board have reason to congratulate themselves on the moderate cost at which their work will be completed.

In making the foregoing comparisons, the item of bridges has been deducted in each case, because that is the only way in which a comparison can be fairly made.

There are five bridges on the Raleigh and Gaston rail-road, most of them in situations of peculiar difficulty. There are few bridges in the world higher than that over Tar river. The aggregate length of the bridges is 3,240 feet, and their cost will be $155,000. When this is included, the cost per mile of the road will be $14,378. The bridging on the Petersburg and on the Richmond and Fredericksburg roads has been far less, while that on the Richmond and Petersburg road has been greater than on this. The cost of the Richmond and Fredericksburg road, when bridging is included, is $13,934 per mile, and that of the Richmond and Petersburg road $31.110 per mile; that of the Petersburg road is $10,110 per mile.

Comparisons equally as advantageous might be made with many other works, but they are deemed unnecessary. I will merely add a list of several rail-roads and their cost per mile, taken from the late report of the president and directors of the Housatonic Rail-Road Company:

Boston and Worcester rail-road,		$37,000	per mile.
Boston and Providence	"	42,000	"
Norwich and Worcester	"	22,000	"
Western	"	34,000	"
New-Jersey	"	45,000	"
Camden and Amboy	"	40,000	"
Columbia and Philadelphia	"	40,000	"
Albany and Schenectady	"	61,000	"
Utica and Schenectady	"	19,000	"
Stonington	"	52,000	"
Hartford and New-Haven	"	20,000	"
Housatonic	"	15,000	"

It should be mentioned that the Housatonic road is just commenced, and that it follows the remarkably level valley of the Housatonic.

As some apprehensions have been expressed that the stock of this road will not be valuable, I hope I may be excused for saying a word on the subject.

It is well known that, since the road went into operation, causes beyond your control have prevented you from offering such facilities to the public as would ensure a large amount of transportation; and yet the amount has exceeded what any one anticipated. No reasoning man can now doubt that the tonnage transported over the road will fully equal the expectations of the most sanguine among us.

It has been suggested that the transportation of goods and produce on a rail-road yields but a small profit. Let us examine into this.

It may be seen, by a statement made by the second auditor to the legislature of Virginia, on the 1st of January, 1839, that the state has received dividends on her stock in the Petersburg Rail-Road, amounting, in all, to 36½ per cent. on the whole investment; while the whole amount of interest which the money could have produced, had it been loaned out, would have been 27½ per cent. We see therefore that this is a decidedly profitable stock.

If we examine the sources of revenue on the Petersburg Rail-Road for two years past, we will find that in 1838 their receipts were, from freights $68,410, and from passengers $38,692; in 1837, the receipts were, from freights $48,300, and from passengers $27,161. We see that the greater part of their revenue is from the transportation of goods and produce.

In truth, it is only necessary to have a large amount of tonnage to make it profitable; for the expenses of transportation do not increase in the same ratio with the amount transported. It will require a certain amount of transportation on a road to pay expenses; but after this quantity is exceeded, the transportation becomes profitable. Depots must be kept up at regular intervals, and a certain expense must be incurred at each, however small the quantity of produce which is received may be; but the whole of this expense might remain the same, though the amount of tonnage received were doubled or tripled.

I contend, therefore, that the transportation of goods and produce may be made profitable, and that it will be so on the Raleigh and Gaston Rail-Road.

It is true that the profits arising from carrying passengers are much greater; and I do not think there is any reason to suppose that we will not derive a handsome revenue from this source. The local travel on the Raleigh and Gaston road will be very great, and good stage lines branching off at Henderson and at Raleigh, to the west, will bring a great deal of travel to the road. At present, the difficulty of passing between Columbia and Augusta deters the southern traveller from the main stage line to Raleigh. Could this difficulty be obviated, there are a great many who would prefer this line to venturing out to sea.

Considering all these circumstances, it seems to me that the stock cannot be less than a six per cent. stock, even if the road is never extended south of Raleigh.

If the road should ever be extended to Columbia, S. C., the stock would certainly be one of the best in the union. There is scarcely a man who entertains a doubt of this. The friends of the work know it, and are anxiously endeavoring to find some means of prosecuting this extension. We see every day evidences of the opinions of those whose local interests are opposed to this project.

In a report recently made on an examination for an inland communication between Wilmington and Charleston, by Mr. White, Civil Engineer, he says: "Let us for a moment reflect what will be the consequence of neglecting or delaying the execution of this project. The line of rail-road which is now completed to Raleigh, would be pushed on to Columbia and to Augusta, and then our already languishing portion of the state would be laid prostrate." This shows Mr. White's opinion of the merits of the Metropolitan line as a line of travel. The same report mentions a fact which would be a strong argument in favor of the Raleigh and Columbia road, even if the inland communication between Charleston and Wilmington were effected. He says "that during the sickly season, passengers must be north of Wilmington before sun-down." In short, it is almost too evident to argue, that if Raleigh and Columbia were joined by a rail-road, the whole southern and south-western travel would be brought over the Raleigh and Gaston rail-road.

Let us, for a moment, examine into the chances of this most desirable connection being formed. Surely each stockholder in the Raleigh and Gaston Rail-Road has the deepest possible interest in promoting it. Every stockholder in any of the roads between Raleigh and Baltimore has a deep interest in this project. But no rail-road company, not even the Raleigh and Gaston, has a deeper interest in promoting this work than the Charleston, Louisville and Cincinnati Rail-Road Company. There are two roads now constructing which threaten to take the south-western travel from them. One is the Macon and Savannah, and the other is the Brunswick city and Appalachicola road. If either of these roads is finished, it will take a large portion of the travel from the Charleston and Hamburg road. The only thing which can secure them the travel will be the connection of Columbia and Raleigh by rail-road.

Nor has the Georgia Rail-Road Company less to fear than the Charleston and Hamburg road. The completion of the Macon and Savannah road would draw off the greater part of this travel; and the Brunswick and Florida road would deprive them all of the travel from New-Orleans.

These views are so plain, that the Charleston and Hamburg and the Georgia Rail-Road Company, cannot avoid seeing their danger, and they will certainly do any thing in their power to obviate it.

If there is a rail-road made from Columbia to Raleigh, the Georgia rail-road from Decatur to Augusta, the South Carolina road from Augusta *via* Branchville to Columbia, the Raleigh and Columbia road, the Raleigh and Gaston road, &c. would form a line which would defy all competition. This route would be the shortest that could be travelled. It would pass through a perfectly healthy country, and it would avoid the danger of steamboat navigation at open sea.

The city of Charleston would be very injuriously effected by the travel going through Savannah or Brunswick, for it would then pass Charleston in a steamboat, without stopping, so that neither the city of Charleston, nor the rail-road in which that city is so deeply interested, could be affected otherwise than injuriously, by the completion of this inland route from Charleston to Wilmington, and these other roads in Georgia.

If the Raleigh and Columbia road were completed, the traveller from Charleston itself, instead of going out to sea, would go north through Columbia, and pay a tribute to the Charleston and Cincinnati Rail-Road Company.

In reviewing the whole subject, we see that such a vast amount of capital is dependent for its value on the completion of the Raleigh and Columbia road, that we cannot entertain a rational doubt of its being effected at no distant period.

This being the case, the stock of the Raleigh and Gaston Rail-Road Company would be inferior to none in our country.

All which is respectfully submitted.

CHARLES F. M. GARNETT, C. E.

ON THE PENNSYLVANIA MODE OF GETTING OUT CLOVER SEED.

From the American Farmer.

Observing in the last number a *request* for "information on the best mode of separating the seed from the head or pod of clover." It is a subject that I have paid some attention to for some years past and observed the various machines constructed for the purpose in Chester and Lancaster counties; perhaps two of the first counties that became eminent in the culture of clover in the state of Pennsylvania.

And perhaps as much ingenuity exercised in mechanism for the facilitating the operations of farming as any other section of the union. The present state of cultivation and the limited number of hands to each farm, is a decided proof of the fact.

Much of the seed of clover is now taken out of the chaff by *mills* constructed for the purpose, although considerable is yet trodden out by horses on the floor of their commodious barns. One instance of a late date, I cannot in justice to the inquiry omit.

Being in Philadelphia, and amongst the clover seed dealers, when a *German farmer* arrived with a wagon load of clean seed of the best kind, *seventy-one bushels*, a joint concern between him and his brother—on inquiry, their crop I found amounted to one hundred and thirty bushels, all taken out by treading of horses. The buyers, I also found preferred it to that which was taken out by mills, not being in any way injured by the mill, but by reason of the milled seed not being so perfectly clear: in the operation of milling, the broken fragments of some part of the straw or other substances so near the size and weight of the seed are visible, not being so readily separated with the fan as that trodden out by horses.

Yet I did not find it so objectionable as to make *much* difference in price, but there was a preference in favor of treading.

But as it regards ease and facility to the farmer the mills are preferred; he has only to thresh or tread it off, and separate the chaff and pods completely from the straw and stalks and send it to the mill, he receives the seed fit for the market by paying the toll of one-tenth to the miller for his labor.

Those mills are erected mostly in a situation commanding a circuit of five or six miles round them, and in that distance they get as much work as employs them three or four months through the winter; if well constructed one man and boy are sufficient to attend, except a press of business to require running night as well as day, which will require another hand.

A moderate water power will drive one pair of stones, constructed in the movements on the same principles as for grinding grain, but the stones are of the softer granite kind, as they must not come into close contact like the grinding of grain; in that case they would bruise the seed, which must be carefully avoided by having them well adjusted to their business; the face of the bed stone true and level, the runner true also, and a large eye or hole in the centre, and well hollowed to receive the soft, chaffy substance readily, and a true face of seven or eight inches of the outer skirt or circumference to cause *friction* enough to do the business without any furrows in either of them, but picked rough.

As the seed passes from the stones it is fanned, and what is shed out passes off through a screen or sieve, and the light, dusty part of the chaff is blown out at a window, the remaining heavier chaff that has seed yet remaining in, it is raised by elevators and falls by the stone in order to go through again: all this is done by the water power, and is continually going on with regularity until the parcel more or less becomes finished.

This is the general principle of the mill operation, and perhaps as much as is necessary to say without going into a minute specification.

Any person who wishes to erect mills, I should advise to examine those in operation, as this is the season they are generally at work, and satisfy themselves, as there are various modes of construction though all on the same principle. I have seen them with the under or bed stone running instead of the upper one; it had one advantage, there was no obstruction of the feeding in the seed through the eye of the upper one, yet it might have its disadvantageous complexity in other parts.

Upon every consideration, I am ready to believe where much clover is cultivated the *mill* is decidedly the best plan for dispatch, although an unpleasant, and I might say, unhealthy business for the miller on account of dust.

A neighboring farmer last season threshed off his clover from the straw, the product of *eleven acres*, and carried it to the mill, which produced twenty-two bushels, and left him twenty, or thereabout, after paying the miller's toll, he considered it much easier than to encounter the treading out that quantity in his barn as he was weak handed, his whole force was one man and boy beside himself.

Those who are more than five or six miles from a mill, think the transportation, together with the loss of the offal for manure, to overbalance the gain by milling, and they mostly tread out with horses as they take frosty, winter weather, when snow is on the ground; and this serves for in-door work—all is saved—no toll to pay nor offal lost from the manure heap.

Perhaps information may come on this head from other quarters, it will then be seen how different neighborhoods agree on this business, but if any thing better appears, the editor will please to suppress the foregoing sketch of the subject.

C. KIRK.

Note.—When barns are wanting, the mill must be preferred.

Brandy Wine, 27th, 12th Mo. 1820.

OBSERVATIONS ON THE CHARACTER AND QUALITIES OF HERDS, TIMOTHY AND OTHER GRASSES.

From the American Farmer.

Brandy Wine, 25th, 5mo, 1820.

Esteemed Friend—I am pleased to find the editorial note in last number of the American

Farmer, discriminating between the different kinds of clover as also the timothy, and herds grass; the two latter have been so long cultivated, as to be as I had supposed sufficiently known, but have found them several times spoken of in the Farmer as the same, and lately by our respected agriculturist, T. Pickering.

The timothy grass, with a cat tail head, as some term it, is so general and well known that I should suppose it scarcely needs further description, only the *common hay* of livery stables and taverns through the middle states.

The herds grass is frequently sown and mixed with the former in hay, supposed by many to be equally good; they ripen much about the same time, the top or seed spreads into numerous branches, resembling an oat's head, only more numerous in branches, with an abundance of seed, rising on good soils to 2 and 3 feet in heighth, and is often termed red top; as one kind that is generally cultivated is of a *red* cast, and when in bloom gives it a remarkable red hue, and this kind virtually the same, but void of this red appearance otherways, in every respect the same, as far as I have been able to discover;* as the former, they are both sown in low grounds, and when first introduced bore a high character on account of the advantage of thriving in wet drowned lands better than timothy or any other grass.

This circumstance gave the herds grass a recommendation beyond its real merits—it filled the soil whereon it grew with numerous fibrous roots, so as to make wet grounds more passable with teams in collecting the product of such lands, and at the same time produced a better substitute for the product of those soils, that were too wet for other valuable grasses; by this means it was propagated until the seed being transplanted with hay on to high ground, the disadvantages then began to appear; the numerous roots as before mentioned, would take possession of the soil to the exclusion of every other kind, and every product of a better quality must give way to the strong spreading fibrous roots of the herds grass, seeding so abundantly as to predominate; and the plough so efficacious to destroy every *other kind* is ineffectual as it regards this, without the aid of very dry seasons, and even then it is ineffectual to entirely destroy it; as the fence side and road sides, afford seed enough to introduce it again into the fields.

The excessive predominance of root is objectionable on all high lands, as it lessens the product of the top by the soil becoming so bound with the abundance of roots, as to make it a diminutive production after a few years, and the quality not equal to many other grasses.

The soil becomes parched with drought in hot seasons, under a crop of this or any other that fills the surface with such a multiplicity of fibrous roots; the same remark is applicable to the timothy grass, though not so excessive in roots, yet a piece of land under either of those, when ploughed in dry weather, is remarkably exhausted of its moisture, when compared with the same kind of soil under a crop of either of the clovers or ripple grass, under similar circumstances in every other respect.

Although it ought to be observed, that those former described thirsty exhausters are very deficient in their succulent and nutritive qualities, when compared with several kinds less thirsty for humidity of soil, and abundantly more juicy in their constitution, which, from my observation, I am ready to believe furnishes a richer food both green and dry; but what is remarkable is their requiring less from the soil, (I am fully convinced,) they must receive from other sources, consequently requisition to a greater amount must be made from the surrounding atmosphere; being less in their demand for moisture of soil, and yet retaining so much sap through the dry season, a time when the juices are matured for preservation, appears to me ample proof of furnishing a richer food, when preserved in this state.

The herds grass, therefore, being adapted to wet soils, cannot be of the first quality for hay.

It being a well ascertained fact that *high lands*, from grasses calculated for such situations, judiciously selected, produces the most nutritive provender for cattle either green or dry, but more readily discovered in a dry state, when preserved at the crisis of perfection.

Thy friend,
CALEB KIRK.

ON RECLAIMED MEADOWS.

From the Essex (Mass.) Agricultural Society's Transactions.

In submitting their report, for the current year, the committee have great pleasure in remarking that they have reason to believe that there is an increasing attention paid to these improvements.

The number and length of the statements that have been furnished to the committee, and which are annexed, seem to render it proper that they should abstain from a report any more detailed than is absolutely necessary.

They have viewed the premises described in the several statements, and have examined with attention the claims made for the improvements.

They award the first premium of twenty dollars to Timothy H. Brown, of Saugus, and the second of ten dollars, to William Osborn, Jr. of Salem, for his land in Saugus. For the Committee,

N. W. HAZEN.

N. W. HAZEN,
AMOS SHELDON,
ASA T. NEWHALL,
DANIEL PUTNAM,
} *Committee.*

Timothy H. Brown's statement.

To the Committee on the Improvement of Wet Meadow and Swamp Lands:

Gentlemen—The improvement that I submit to your examination has been made upon between five and six acres of swamp land, situate in the town of Saugus. The mud or soil varies from two to twelve feet in depth. Two years ago, it was so thickly covered with briars and bushes, that a dog would have found difficulty in passing through it. These bushes I mowed and burnt on the ground. There were so many stumps and logs that it was impossible to plough; so I commenced cutting the surface into squares about fifteen inches each way,

* Therefore usually called white top.—*Edit. Am. Far.*

and then with forked hoes, made very strong, pulled off the sod and cleared out the stumps and logs. Then using the same hoes, cleared out all the small roots, levelled the surface, and placed back the sods the other side up. This part of the work I did in strips of about one rod in width. In August, 1837, I commenced this. In 1836 I mowed the bushes and dug one ditch. The stumps and logs I took out without the help of oxen. Some of the stumps I should judge had nearly half a cord of wood in them. There were a considerable number of trees that had blown down, and the meadow had formed over them. Many of them were perfectly sound, and some measured sixty feet in length. The stumps were very numerous. I found three tier deep, and under the bottom lay a pine log, that had some time or other been on fire. After going over the surface and clearing in the manner I have described, I found the expense to have been, at a fair estimate for the labor, $504.

In the winter I hauled off the wood and piled it up for coaling. The largest of the small roots I selected for my own fire, the smallest I burnt upon the ground. I commenced harrowing with an iron tooth harrow, as soon as the frost began to come out of the ground. The sods being fastened down by the frost, and the harrow passing over the upper side, they mouldered away as fast as the frost would admit; and when the harrow had got to the depth of the sods, they were worked up pretty fine, the frost below making a bridge for the team to pass on. About the first of last May I began planting with potatoes, without any manure. I cut the seed very fine, and planted the parts near together. I merely marked the hills with a hoe, then a man followed after with the seed, and then another man to cover it. So I made speedy work in planting. I calculated to have the seed, when covered, one inch from the surface. I used sixty-nine bushels of seed, that is, about fourteen bushels to an acre. I should not have seeded so light, had I not felt an uncertainty about obtaining a crop, without the use of manure. There was but one man, among those I consulted, who gave me any encouragement. Many said I should lose my labor. To their astonishment I harvested 927 bushels of excellent potatoes. The expense incident to planting, hoeing, harvesting, &c., including the seed, I estimate at $117. The land is now in a state that I can plough it at pleasure. On a small piece of the land I planted corn, and it ripened well. On a small piece I sowed wheat, but it came to no perfection, either in the straw or grain.

The wood was converted into charcoal. In 1837 I coaled 1201 bushels, which sold in the market for $166 40. In 1838 I coaled 4200 bushels, which sold on the hearth for $333 33, and I ascertained from the purchaser that it sold in Boston market for $630. I sold wood to the amount of $50, and I estimate that which I used for my own fire worth $50 more. I have on hand one hundred cart loads of the bottom of the coal pits, which I value at $75, having had some knowledge of its virtue as a manure.

The account may be thus stated:

Proceeds of coal in 1837, -	$166 40	
Do do in 1838, -	333 33	
Value of crop of potatoes, at 50 cts. a bushel, - - - -	463 50	
Value of ashes for manure, &c.,	75 00	
Value of wood sold, - -	$50 00	
Value of wood used, - -	50 00	
Increased value of the land, it being now worth $125 an acre, and originally thought to be worth only $12 an acre,	565 00	
		$1702 23
Labor, &c.		
Levelling and clearing the land, &c., - -	$504 00	
Carting the wood and roots,	35 00	
Harrowing, &c., - -	12 00	
Planting, hoeing, harvesting, &c., - - - -	117 00	
Coaling in 1837, - -	40 00	
Coaling in 1838, - -	100 00	808 00
Balance in favor of the experiment,		$894 23

I have about two acres more of similar land, that I am managing in the same way. It requires much hard labor, but it yields a fair reward.

Yours with respect,

TIMOTHY H. BROWN.

Saugus, December 7, 1838.

—

William Osborn, Jr's, statement.

The subscriber presents the following statement to the Committee on Reclaimed Meadows:

The piece of meadow land reclaimed and cultivated by the subscriber lies in Saugus, and contains 4 acres, very wet, and peaty bottom, and admitted of running a pole in some places 10 feet without reaching hard bottom; covered with a large quantity of pine stumps, and a young growth of maples, alders, dogwood, &c.

In the first place I commenced removing the sods and roots from about one-fourth of an acre, and burning the same, but finding the land would not be made sufficiently dry by this process, I turned the sods over the whole piece in the fall (1837), and let them remain for the action of the frost until spring (1838), then had them chopped with large grub hoes, fine enough for planting potatoes, &c. The process of turning over the sods and getting out stumps were both done at the same time; after doing this I run a ditch around the piece, and four ditches across it, 3 feet deep and 4 feet wide, with an outlet sufficient to drain the land at all times last season, to 15 inches below the surface.

I annex a rough sketch of the different lots, which I will describe:

Lot No. 1. Containing one-fourth of an acre, nearest the upland, was cleared in the fall and spring by chopping and clearing the small roots, and made in a good condition for cabbages; manured with compost of loam and manure, and a small portion of unbleached ashes put in each hill. Crop, 50 dozen large cabbages.

Lot No. 2. One-fourth of an acre, pared and burned; sods not fully burned collected into heaps and mixed with stable manure, lime, and salt in spring chopped fine and spread in drills: planted with ruta baga. Crop, 100 to 150 bushels—mixed with others and I cannot give the exact number.

Lots No. 3 and 4. Sods turned and mud wheeled

on from the ditches and spread; raked in rye and grass seed. Crop, 5½ bushels rye, and 18 to 20 cwt. of hay, without manure.

Lots No. 5 and 6. Potatoes, squashes, pumpkins, &c., with coarse barn and stable manure.

Lot No. 7. Corn, potatoes, and squashes.

The amount of manure used on the whole piece, about 6 cords; 2 casks of lime, 1 bushel salt.

Estimate worth of crops, and expenses.

Crops.

327 bushels potatoes, at 60 cts. per bushel, - - - -	$196	20
5½ bushels rye, at $1 25 cts. per bushel, - - - -	6	87
8½ bushels of corn, at $1 per bushel,	8	50
100 " ruta bagas, at 30 cts. per bushel, - - -	30	00
18 to 20 cwt. hay, - - -	12	00
50 dozen cabbages, at 50 cts. per doz.	25	00
2000 lbs. squashes, - - -	20	00
Value of fuel taken off, at least	25	00
	$332	57

Expenses.

Cost of land, - - -	$25 00	
Labor, per contract, - -	86 50	
Ninety-four days by help on farm,	70 50	
Seed potatoes, - - -	15 00	
Rye and grass seed, - -	1 17	
Six cords manure, - -	30 00	
Two casks lime, - -	2 00	
Twenty-two days labor, gathering crops, - - - - -	16 50	$246 67
Net profit, - - - - -		$76 90

The present value of the land I leave for the judgment of the committee.

WM. OSBORN, JR.

December, 1838.

LABOR—THE GREAT WANT OF THE TIDE WATER COUNTRY.

Editorial from the American Farmer.

Taking Maryland as an example for the whole tide-water, slave-holding country, we believe it might be safely affirmed that in the twenty counties of this state, one hundred thousand able bodied laborers might be *profitably* employed in agriculture. That is—one hundred thousand could, with their labor, *produce* as much as would give them comfortable subsistence, supplying abundantly all essential wants, and leave a surplus adequate to the support of a small family for each laborer. The very lands that now lie waste, absolutely waste, in surplus wood and unimproved swamps in Maryland, yielding no interest on the capital which the owner esteems such lands to be worth, would support, and well support four times the present population of Maryland. When we say four times, we do not name that number as the result of any thing like exact calculation, intending only to be *within bounds*. If a wall, like that of China had been built around "the old thirteen" at the time when they resolved to set up for themselves, how different would be their aspect, and how much more highly cultivated, populous, strong and comfortable at this time—but our policy has been, by the prodigal management of our public domain, to set in motion a constant current of emigration, which has not only carried off from the sea-board, all accessions of labor and capital from Europe, but which has drained the old states of their most active and vigorous population. In the low price of the public lands, and the doors left open for speculation and frauds, the most tempting bribes have been offered for the desertion and abandonment of the most glorious climate and country that God ever spread out for man's enjoyment, between the Delaware and the Mississippi east of the mountains. Was ever country so well watered and so abounding in all that land and water can contribute to good living? Yet for want of labor, and of capital to hire it, lands lie waste and unimproved that would feed, clothe, educate and supply with all the necessaries of civilized life, twenty millions of people *without being crowded*—two things appear to be wanting to bring our waste or unoccupied lands into active productiveness—*Capital*—and skill and prudence to *apply it exclusively and faithfully to that object*—how can these two desiderata be supplied—banks have we had over and over again—most of them chartered under a promise of *benefit to the agricultural interest*—scarcely one of them in town or out, that does not bear that *prestige* on its face—read the promises of their notes, and you might swear that Agricola was the God of their idolatry—some with rank imposture display sheaves of the rankest wheat—others hogsheads of tobacco that look as handsome as any that ever were made by a Bowie or a Barbour—but these like the promises of political aspirants before an election—are made *to the ear*—and broken to the hope. The delegates of the landed interest, of whom these charters were obtained, have given themselves and their time too much to party intrigues—the thought and the labor that ought to have been exclusively and conscientiously bestowed in devising means to give activity and profit to capital in real estate, the best of all capital, have been devoted to their own aggrandizement—or in still more disreputable subserviency to the schemes of profligate and ambitious partizans—men who would sooner rend asunder every tie of social and political existence than not be successful in some trick of grovelling ambition and selfishness—some of your *new fledged friends of the dear people!*

Is their no means by which the wants we have indicated can be supplied?—no means whereby the farmer can anticipate what *is in his land*—Credit, which is so much abused in a two-fold sense, is the life-blood of a new country—it enables us, by the application of a skilful industry to make something out of nothing—it is the true elixir whereby we are empowered to open a gold mine in every unimproved swamp, and in every piece of uncleared land—what farmer or planter, of ordinary skill, industry and forecast, that if he had means to hire additional force, even ten times as much as he has, could not support in comfort and pay that additional force and augment the value and productiveness of his estate—but where can he get the capital—if he borrow of a bank, it must be on "*real paper*," to be paid back in a short time, even before his most rational and infallible arrangements for improvement of his land have

commenced to operate—as a general rule capital employed for the benefit of agriculture, ought, provided the interest is paid *punctually*, not be called on for any portion of the principal, under 12 months; and then to be gradually returned to the lender at stated times, or sooner, at the option of the borrower, on notice to the lender; the security for the latter always remaining sacred and intangible—what legislative plan can be adopted to accomplish this end? We invite discussion—not in the shape of interminable essays, with long prefaces and short arguments—like the giraffe, all neck and no body; but dissertations that come at once to the point, and so plain and practical that he who runs may read and understand. The reader will have a view of the use and value of capital in *agriculture*, as well as in *manufactures and commerce*, (for it is as indispensible to enterprise and profit in the first, as in the two last) by reading the following account of the expense and profit of improving between "*five and six acres of swamp land*" in Massachusetts*—here was an instance of expenditure in the first cost of improving—carting off the wood and roots, harrowing, planting, hoeing, harvesting, coaling, &c. of $808, equal to about $133 *an acre!* and yet, the operation netted $150 an acre! leaving the *land*, which was before, like thousands and tens of thousands of acres in Maryland and Virginia, altogether unproductive; in a condition probably, to yield hereafter 6 per cent. interest on a capital of $600 per acre! What planter or farmer in the tide water country south of the Delaware, being a man of any enterprise and reflection, who does not feel that he could do something in some degree approaching to this, *if he had capital!* We once heard Mr. Crowninshield, formerly secretary of the navy, say that he gave for land between Boston and Salem one hundred dollars an acre, which it afterwards, (and which he knew would) cost him $50 an acre to clear for the plough—yet he *was well paid.* Ah, if in once glorious old Virginia and Maryland, with their delicious climate, pure water, natural canals to every man's door, and originally fertile soil, we had the *yankee capital* and *labor*, combined with enlightened legislation and genuine public spirit, what a paradise we could make of our country!—now given up to willows and pines—and gambling and politics—not that noble science of politics which teaches us how to use the power which is derived from political association in such manner as shall secure the greatest good to the greatest number—but that odious *game* of party politics, which has for its object the manufacture of great out of little men—the election of *party* supervisors of the road up to *party* supervisors of the union—which teaches the art of procuring fat jobs for the most influential, though they be often the meanest and most ignorant of those who have *influence at elections.*

TO DESTROY YELLOW BUGS.

From the Maine Cultivator.

Many modes of destroying, or preventing the ravages of the yellow bugs that infest cucumbers and melons have been recommended—such as charcoal dust, onion tops, ashes, tobacco juice, &c. but after all *we* never found any thing that could so surely be relied upon as the *fingers.* Visit the plants for a few days every night and morning, when the air is chilly or damp, and kill every one you can find. In a short time you will have destroyed the whole, for they do not travel far. Ordinarially those which are found on plants, are hatched in the same garden. The course we speak of is attended with some trouble; but it is the most sure and effectual one we have ever been able to find out. In the middle of the day, when the sun is out warm, they are very active and are not easily taken; but before breakfast in the morning, and after tea at night, you may destroy all that are on the plants. A few days will make an end of them.

BIRDS ON FARMS.

From the Farmers' Cabinet.

The value of birds in districts settled as thickly as the country of Philadelphia, is appreciated by but few individuals. The beauty of their plumage delights the eye; their song cheers the husbandman in his toil, and gives a charm to the country which no resident can too highly appreciate. The joyous twitter of the swallow and the martin, the song of the blue bird in the spring, the delightful wild notes of the partridge, the lark, the plover, the robin, the thrush, the mocking-bird and the sparrow, awaken an interest in those companions of the farmer, which should impel him to prompt and energetic exertions for their preservation. And let me ask, was there ever a time when these interesting creatures demanded protection more than at the present period? In this country our farms are overrun by parties of worthless boys, and more worthless men, who employ their time in destroying whatever comes in their way. They break our fences, alarm and very often injure our cattle; jeopardize the lives and limbs of our people, and the teams with which they are at work, and many of them do not hesitate to plunder us of our poultry when an opportunity offers. They tread down our crops and injure and annoy us in various ways, and all for the ostensible purpose of destroying the few birds which yet remain with us, which are not worth to them the cost of the powder and shot used in their destruction. When our horses are alarmed and become unmanageable in consequence of their firing, they very often refuse to abstain from what they denominate their sport; and my people have been compelled to quit their work for fear of some serious accident, and still they would persevere. Let us no longer submit to such annoyances and injury, but assert our rights boldly and fearlessly. There is a law which applies to this country, which, if put in force, is abundantly sufficient to afford our birds protection, and to rid us of this intolerable nuisance. The value of birds to a farmer, few are able to estimate. To say nothing of the songs of those warblers, to which I always listen with delight, their value in the destruction of bugs, flies, worms, and noxious insects, is calculable. The swallow, the martin and many others, busily employ themselves in destroying mosquitoes, flies, and other tenants of the air, which annoy us with their sting, or injure us in other respects.

The robin, wood-pecker, sap-sucker, and various other birds, protect our orchards, destroy the worms

* See page 391 of Farmers' Register.—Ed.

and insects that there do us mischief, and in their absence there is no little labor required to protect and save the trees which their industry alone would relieve us from. Besides, they do their work better than we can. The presence of a worm in a young tree is only indicated to us by the borings thrown from the orifice made by his entrance, and in removing them with a knife serious injury is done to the tree. The bird, on the contrary, eats the egg, destroys the worm when young, or if he has avoided his vigilance and got under the bark, nature has endowed the two last mentioned with a strong bill with which to strike through the bark, and long and rough tongues with which to drag the lurking villain from his hiding place, and that too with the least possible injury to the tree. Where is the farmer who has not seen his apple trees perforated along the whole length of their trunk by these industrious laborers; and who has not seen such trees distinguished for their health and fruitfulness?

I can recollect when there were large orchards of healthy trees in parts of this country where it is now almost a folly to attempt to rear an apple tree. Those orchards that are near clumps of wood, may still exist here, but where there is no such harbor for birds designed for their preservation, it is in vain to attempt to rear a tree and preserve it against the destructive ravages of the insects that feed upon it.

The partridge, the plover and lark, too, feed upon insects and labor diligently to promote the interests of the farmer in destroying his enemies. What gives a man more pleasure than when walking over his grounds, he is welcomed by the shrill whistle of the partridge, who, grown familiar with his friends and daily companion, cheers him in his toil and delights him when at leisure?

These birds I have often seen so tame that they would scarcely leave my path, and I remember a covey that during one winter, would frequently come to my gravel walk to receive the feed that was placed there for them. They amounted to about twenty, and I set a high value upon them; but there came upon my farm, during my absence, two gunners with their dogs, and destroyed them all. I assure you I felt the loss of those birds more than I would that of the best horse in my stable.

For myself, I feel in regard to my birds as the ancients did of their household goods; nor can I control a feeling of indignation and a sense of injury, when I see my neighbors or strangers wantonly destroying them upon my premises. There are many depredators in our wheat fields that are destroyed by the partridge, for it is on these he feeds. The lark and the plover do their work in our grass lands. The sparrow, blue-bird, wren and other small birds, labor diligently in our gardens, orchards and pleasure grounds, and they should be welcomed as agreeable visiters by all who reside in the country.

Boxes for their accommodation should be nailed to the trees, and by carefully avoiding to alarm them, and other kind means, they could be domesticated among us. They will otherwise take to the woods and by-places, and we shall be deprived of the pleasure of listening to their cheering songs, and lose the advantages of their incessant labors.

Farmers, think of this. Let us not be unkind to our neighbors, nor deny them reasonable privileges, but do not continue to refrain from expressing a sense of injury at their depredations, and of making known to all the high value we set upon our birds.

A WEEK'S MILKING OF A DURHAM COW.

From the United States Gazette.

The Philadelphia U. S. Gazette gives the following account of the milking of a short-horned Durham cow during the week commencing the 27th of May:

	Morning		*Evening.*	
	Quarts	Pints	Quarts	Pints.
Monday	13	0	12	0
Tuesday	12	1	13	1
Wednesday	13	0	14	0
Thursday	13	0	15	0
Friday	15	0	14	0
Saturday	14	0	15	0
Sunday	15	1½	15	0½
	93	2½	99	1½
			93	2½

Total yield for the week commencing 27th of May and ending 2d of June, inclusive—7 days 104 quarts,

Being within a fraction of 28 quarts per day, and from which were made 14¾ lbs. of butter of the finest quality.

The weather was cold, chilly, and wet, and it was supposed that the quality was less than is usually made under favorable circumstances by the same animal. Our friends in the farming interest will see the necessity of improving the breed of cattle as much as possible. This cow will cost but little more to keep in the best manner, than an ordinary, poor, thriftless creature, that will neither give much milk nor that which is good. —*Boston Daily Times.*

Still better.—It gives us pleasures to record the successful efforts of gentlemen to increase the means of comfort to us, who are cramped in cities; and certainly, the augmenting of milk and butter is one of those exertions which must minister to such comforts. We give the following as the good doings of "*Dairy Maid*," the property of our neighbor James Gowan, of Mt. Airey, Germantown.

Dairy Maid's yield of milk for one week, from Wednesday, 5th June, to Tuesday, the 11th, inclusive.

	Morning.	*Noon.*	*Evening.*	
	Qts.	Qts.	Qts.	Quarts.
Wednesday	12	6	7½	25½
Thursday	12	7	7½	26½
Friday	12¼	7½	7¼	27¼
Saturday	13	7½	8½	29¼
Sunday	13	7½	8½	29
Monday	13	8¼	8	29¼
Tuesday	11	8½	9	31½
		Total		198½

Being an average of more than 28 quarts per day. Butter not yet ascertained. The coming week's milk, which is expected to be greater, from improved feed will be reported. The feed of the

past week was pasture, with a basket of grass morning and evening, cut from a head-land of a grain field, except on the evenings of the last three days, when a handful of chopped oats and corn, with shorts from the hay-mow, was added.

The above yield is perhaps unprecedented by any *young* cow in this country under the circumstances, being in the fourth month from calving, and the calf having been with her till within a few days of the trial. The milking at noon was adopted on account of the cow having been brought from the field to her calf, daily, at that time.

Dairy Maid is a beautiful roan, of the improved short-horn Durham stock, bred by Mr. Whitaker, of Yorkshire—imported last fall, and in point and proportions is said to have no superior. Her pedigree, which may be found in the third volume of the "Herd Book," is inferior to no cow on record.

ON BRICKS AND BRICK MAKING.

From Millington's Civil Engineering.

Next in order to natural stone comes brick, which is an artificial or manufactured kind of stone, most extensively used in vast building operations. The brick offers some advantage over stone, arising chiefly from the expedition and ease with which the work may be conducted. No stone can be obtained from the quarry of a shape fit for use in close jointed work, without the tedious process of sawing or cutting it to a fair face; and as stones are large and heavy, there is great loss of time in transporting them, and raising them to their positions in the wall. Stone cannot always be procured, owing to local circumstances, but there are few positions in which brick-earth cannot be obtained within a few miles; and bricks are very portable, are square and ready formed, and if good, and used with good mortar, will produce a better and more durable wall than could be produced by small blocks of hard stone. The stability of a stone wall, with straight joints, depends more on the weight and magnitude of the stones than on the adhesion of the mortar. For as the harder stones are not absorbent, the mortar will not adhere to their surfaces and produce union; while, from bricks being of an opposite character, the brick and mortar, after a short time, become one, and their adhesion is so strong that it is difficult to separate them.

Bricks have, accordingly, been used by all nations from the earliest antiquity. The bricks of Babylon, many of which bear inscriptions, are known at the present day, and many of the admired relics of the ancients, still extant in ruins, exhibit the perfection to which the art of brick-making had arrived in these early days. Some of the structures of Egypt and Persia, the walls of Athens, the Pantheon and Temple of Peace at Rome, and many other buildings are constructed of brick. What is surprising, however, is that many of these bricks, which have stood the test of about 2000 years, do not appear to have been burnt or submitted to the action of fire, to produce their hardness and durability, which can alone be attributed to the extreme dryness and heat of the climate in which they were exposed; for these bricks, on being soaked in water, crumble to pieces, and disclose straws, reeds, and other vegetable matter, from the existence of which it is inferred they have never been submitted to any greater heat than that of the sun. At a later period all the bricks of the ancients were burnt, and it is these that chiefly remain at the present day.

A brick is nothing more than a mass of argillaceous earth or clay, properly tempered with water and softened, so that it can be pressed into a mould to give it form; when it is dried in the sun, and afterwards submitted to such a heat as shall bake or burn it into a hard substance. This method of forming bricks puts a limit to their magnitude; for, as the material of the brick is a bad conductor of heat, so, if they were made very large, the heat applied externally would never reach the inside so as to bake it properly, without vitrifying and destroying the outside; hence bricks must be confined to such magnitudes as will admit of their being well and equably burnt throughout. In England, the size of bricks is determined by law, and no man can make bricks larger or smaller than the prescribed dimensions. This law is, by many, considered a hardship; but it was established for a two-fold purpose, first, because all bricks made there are subjected to an excise duty or tax of about a dollar a thousand, which tax could not be equalized, unless a size was fixed for the brick; and secondly, it enables a person building, to know the exact quantity of work he can erect for a certain sum of money, and prevents brick-makers taking advantage, by sending out small bricks, or making them so large that their insides may not be hard and well burnt, a circumstance that would produce unsound work, deficient in durability.

This law, as far as regards the determination of the size of the brick, the writer is now convinced is good. No regulation appears to exist in the United States, beyond the custom of the place and the caprice of the maker. One man makes a large and full brick, and gets a good price for it, because fewer bricks will do a given quantity of work. Another sells cheaper, but he manufactures a smaller article; and it frequently happens that when a builder cannot get his whole supply from one maker, he is compelled to go to another, when probably his size will not work in with the first, unless a previous bargain has been made as to dimensions. The writer having occasion to use a large quantity of bricks, and having consumed the first quantity delivered, had occasion to order many thousands more from a stranger, for which a written contract was made, and on their delivery he found each new brick an inch and a half shorter than those previously used. On remonstrating, he was told that no dimensions had been specified in the contract; that those delivered were of the usual size, in that part of the country, and no redress could be had; notwithstanding it took nearly one-fourth more bricks to do the same quantity of work, as would have been necessary had they been of the proper, or usual standard size, which, in London, is eight and three-quarter inches long, four and three-eighths wide, and three and three-quarter inches thick; the intention of these dimensions being, that each brick, laid end to end, or every two bricks side to side, with the necessary quantity of mortar between them, shall make exactly nine inches of work; or that four bricks laid one on another, will make a foot perpendicular, or twelve courses to the yard. In Philadelphia, the gene-

ral run of bricks is eight and a half inches long, and fourteen courses with mortar to the yard perpendicular, thus consuming more bricks and mortar than the English gauge, for the same quantity of work. The young engineer must, therefore, not only attend to the quality, but to the size of bricks, whenever he makes contracts for their purchase.

Although clay has been named as the proper material for making bricks, yet every clay will not answer equally well. Pure clay is quite white, and in burning does not change its color, as may be noticed in tobacco pipes, which are made from it. The brown color of common clay is usually derived from oxide of iron, and this causes the brick to assume a red color when burnt; but as red bricks are not approved or used for outside work in London, where more bricks are made and consumed than in any other part of the world, the brickmakers have contrived means of changing their color in burning to a pale buff, very much resembling the color of Bath-stone, and which gives buildings a much handsomer appearance, and closer resemblance to stone, than would be expected. The mode of coloring is kept as secret as possible, among the manufacturers; but it is partly produced by mixing powdered chalk with the clay, and is, probably, greatly dependent upon the firing of the kiln and the fuel used, since many bricks that exhibit a beautiful and perfect buff hue on their outsides, are red and dark within, if broken.

A stiff, tenacious, plastic clay is unfit for making bricks, as they generally split and fall to pieces in burning. Brickmakers call such clay *strong earth*, and they prefer what they term a *mild earth;* that is, one of less tenacity, and having more the character of loam. When the loamy soil is not found naturally, it is imitated by adding sand in considerable quantity to earth that is too strong. The London brickmakers, in addition to sand, constantly add a considerable quantity of *breeze* to their clay, and they assert that it is this material that gives the peculiar character of color, hardness, and durability, to London bricks. This is somewhat corroborated by the country bricks, made without breeze, being red and of a very different character.

To explain the term breeze, which seems to perform so important a part, it becomes necessary to say that throughout the immense metropolis London, no fuel is used in any of the houses but bituminous or blazing coal, very similar to that known in this country as the coal from Richmond in Virginia. Every house has what is called a dust-hole, in some external part of the premises, into which the ashes and refuse of these fires are put, and the same place is also a depository for any other offal of the house, which must not be thrown into the streets. The parish authorities contract with persons having horses and carts to clear these dust-holes about once a week or oftener, without any expense or trouble to the housekeeper, and the stuff collected is all carried to certain fixed depositories on the outskirts of the town. Here hundreds of men, women, and children, are daily employed in assorting and looking over the mountains of discarded treasure thus brought in, and now become the property of the contractor; apparently worthless in the eyes of the public, but not so in fact, for most of the men who have undertaken this business, in conjunction with that of scavenger or street-cleaner, have, in almost every instance, amassed immense fortunes. The heaps of soil are carefully raked over, and every atom of them passed through several gradations of sifting, with sieves of various fineness. Rags, old iron, metal, bones, and such things as are usually thrown away, mixed with the refuse fuel, form the aggregate of the mass, and all these things are separated and placed in separate heaps. Here the paper-maker gets supplied with much common rag for packing-paper. The old iron is returned to the forge to be manufactured into scrap iron. The hartshorn and ivory-black manufacturer gets supplied with bone; much new and unconsumed coal and cinders are obtained, and this furnishes the only fuel with which all the bricks of London are burnt, while the small and almost incombustible matter, consisting of very small cinders, and new coal, fire-dust, decayed animal matter, and whatever else may be mixed in the mass is *breeze*. This breeze is mixed with the clay, is in a great measure combustible when exposed to the high heat required to burn bricks, and it is said to assist the brick in getting red hot throughout its substance, and otherwise to improve it very materially.

A great deal of care and trouble is necessary in preparing the earth for making good bricks, in order to reduce it to one uniform texture, and to deprive it as much as possible of all stones that might destroy the form of the brick, by breaking in the fire, or becoming vitrified. The bricks of Philadelphia are in general so good, that we will describe the process used there for making them, and point out where it differs from that pursued near London. The clay in both places is invariably dug in the autumn, and during the winter before frost sets in. The ground is divided out into square allotments called spits, four feet wide and sixteen feet long, which surface, when dug a foot deep, furnishes the right quantity of earth for one thousand bricks, and of course each foot in depth is equivalent to the same quantity. This earth is shifted by barrows to an adjoining piece of ground previously levelled to receive it, and sunk a little under the general surface to prevent water running off. On this it is worked, if in a fit state to make bricks, if not, sand is added in sufficient quantity, according to the judgment of the workman, to make it sufficiently short or mild, and at this period the London brickmaker adds his breeze, which, answering the purpose of sand, it is added in less quantity. It is then cut, slashed, and worked with the spade, adding water to it to soften it; and the quantity of two spits being added together in one heap, sufficient earth to make two thousand bricks is exposed to the frost in each heap, and the more severe the frost is, the better incorporation will take place. Nothing more can be done with it until spring, when the warm weather thaws the heaps, and if the frosting has been effectual no lumps will remain, but the whole will be converted into a uniformly soft and yielding mass. If two wet, the heaps are opened and spread to dry, or if too dry, more water is added, before the last working with the tool, called tempering, in order to render the whole mass uniformly smooth; it is then pressed and patted down, and covered with boards, cloths, or bushes, to prevent the injurious effects of the sun and air, and is now ready for the moulder.

The moulder works at a table or bench in the open air, covered by a shed roof only, to protect him from sun and rain, and the clay is brought to him in a barrow from the tempered heap, and is placed by the boy who brings it on the left hand end of his table; another boy supplies him with dry silicious sand previously dug or provided, and placed on the right hand end of the table, and a third boy stands in front to remove the bricks as fast as they are formed. The mould is formed of mahogany or other hard wood, bound with iron for strength, and cased with iron plate on its top and bottom, or is sometimes lined with thin iron throughout; moulds have been formed wholly of iron, but they are too heavy for expeditious work, and too cold to handle in early spring. The mould is four sides of a box without either top or bottom, as the moulding table forms the bottom, and must be very smooth, on which account, and to prevent wear, it may be covered with sheet-iron. The moulder first covers his table thinly with sand, and cutting off a sufficient quantity of the prepared clay with his two hands, finger-end to finger-end, to form about a brick and a quarter, he kneads it on the table, by pressing on it with the palms of the hands, first drawing it towards him and then pushing it from him, and patting the ends to bring it to a form similar to the mould into which it is to be introduced, (the mould having been previously sanded,) and presses it down with force, so as to fill up all the corners. The superfluous earth is now cut off by running a steel tool like a large thick knife, called a plane, along the top of the mould, when the top of the brick is sanded, and a thin board, called a turning board, as wide as the mould, and three inches longer than it is, is laid over it, and the whole being inverted, the mould may be raised carefully by the two hands, and the soft brick will be left on the turning board, in which state it is taken away. Should any clay remain about the mould, it is now cleaned out and sanded, to prepare it for the next brick. It should here be observed, that the mould must be full half an inch or more longer, and a quarter inch wider and higher, than the brick intended to be produced, as all clay will shrink thus much in drying, and sometimes more.

In order to receive the bricks when moulded, a high and open piece of ground is provided called the floor, and this is formed into what are called *hacks*. The hacks are perfectly level projections of earth about two feet wide, and rising six or eight inches above the surface of the floor, and are fifty yards or more in length, for receiving the bricks to be dried; and they should run in a north and south direction, in order that both sides of the pile may receive its due proportion of sun-shine, and they must be about four feet apart to allow wheeling with a barrow between them. The boy that receives the bricks from the moulder, holds them by the ends of the turning-board and places them on a barrow constructed for the purpose, with a high raised stage of frame-work, that is level when the barrow is running, and holds twenty bricks. It must run upon planks to prevent concussion to the yet tender bricks. He carries them to a hack and lays them regularly upon it, leaving the turning boards under them until the row is nearly filled, and this allows time for the bricks to dry and become a little hard on the surface, which they will do in half an hour in fine weather. Another who is in attendance at the hacks, takes them up and moves them to the next adjoining hack, previously covered with sand raked smooth; and in doing so, places them on their edges by inclining the turning-board with one hand, and applying the other to the brick, while he slides away the boards to be returned in the empty barrow to the moulder. The soft bricks are thus disposed in an angular manner like a worm fence, but in no case more than two inches asunder in the widest part, and not touching any where. The row or hack being finished, the bricks are sanded on their tops, and if the hack is long, the bricks at the end first put down, will be dry enough to permit a second tier to be laid upon them, and so on until eight tiers or layers are so disposed, which is the greatest number that can be placed without danger of crushing or spoiling the shape of the lower bricks, and this number should not be attempted unless the hacks are long, and the weather fine and dry. The object of placing the bricks in this open manner, is to permit the air to blow through and dry them as effectually as possible, but they must not dry too rapidly, as that will cause them to crack. Should the sun be two powerful, the hack will require shelter, which is obtained by constructing a number of light frames of a kind of basket work of twigs and straw interwoven. They are six feet long, as high as the hacks, and made as light as possible. The straw hurdles are so useful, no brickmaker should be without them; they afford shelter against both sun, rain, and frost, (which are the greatest enemies of the brickmaker in this stage of the business,) or they are set up in angular positions to catch and direct the wind into the hacks, if the bricks dry too slowly. Should violent rains come on which might destroy all the work, the top of the hacks must be thatched, by placing long wheat or rye straw transversely across their tops, keeping it from blowing away by planks laid lengthwise on them. The hacks are raised above the natural soil, for the purpose of keeping the lower tier of bricks out of the wet, should rain occur.

In about a week the bricks will be sufficiently dry for turning, which is done by moving them from the hack on which they were first dried, to the adjacent one left empty to receive them. They are now disposed as before upon their edges, but are put parallel to each other, about one inch apart, and the side that was before downwards is turned upwards. In the second tier or course, each brick is placed over the opening between the two below, and so of all courses that succeed until the eight tiers are again completed. In this manner they still expose considerable surface to the air, and as the bricks have now become tolerably dry, and do not require sun, the last drying hacks are sometimes covered for their whole extent with a slight thatched roof, to protect them from rain; or if the kiln is not ready, they are sometimes moved into a building for safety. The hacks sometimes require turning three or four times before the bricks are sufficiently dry for the kiln, and the drying usually takes from three to five weeks, depending on the state of the weather.

Bricks are always made by piece work near London, where a skilful moulder, having all things in good order around him, will mould and hack from five to seven thousand in a day of fourteen hours work, or about five hundred bricks per hour;

but to accomplish this he will require six hands to wait on him, all of which are children. They supply him with the tempered clay and sand, and water to dip his tools into, remove the bricks as fast as they are moulded, and return the turning boards.

When small quantities of brick are required in a country where they cannot be obtained, or for particular jobs, the clay may be tempered and mixed by placing it on a hard bottom, and working it by a shovel or spade with water, and trampling it in the manner already described for puddling instead of waiting for a frost to break it down. In this case more water must be added than is fit for tempering brick earth, but it can be got rid of afterwards by draining it away, or exposing the earth to dry; when the moulding and drying must be conducted as above described, but on a smaller scale.

In the vicinity of London, where the demand for bricks is enormously great, the large brick-makers adopt a different method to that above described for tempering and preparing their clay, but there is no variation in the manner of moulding and drying upon the hacks. The clay is dug in autumn and frosted as usual; but instead of being piled in ridges or small heaps, the whole is wheeled into one immense pile, as frosting the interior is of less importance when machinery is used. At the breaking up of the frost the clay is carried in navigators' barrows to a mill called a pug-mill, where it is worked by horse power, and incorporated with the necessary quantity of sand, chalk, or other material, and water, which is often pumped up and delivered into the mill, by the same power, in such quantity as will reduce the whole earth to so thin a state that it is just capable of running from an opening made in the bottom of the mill for its discharge. It is received upon a wire sieve or strainer, that stops all stones or foreign ingredients, if their size would prove prejudicial to the bricks about to be made. Two capacious ponds or reservoirs, about three or four feet deep, are formed for receiving this diluted earth, and they are so placed in respect to the mill, that its produce can be discharged into either at pleasure, by means of wooden shoots or spouts. The pugged stuff is conducted into one reservoir until it is quite filled, when it is turned into the other; and while the second is filling, the earthy matter subsides in the first, leaving nothing but clear water at the surface, and this is carefully drawn off by withdrawing pegs, that are placed very close, one below the other, from holes in a thick plank let into the upper part of the reservoir. In this way the water is drained off and runs to waste, leaving a finely divided and most equable mud in the reservoir, which becomes of such consistence by draining, that it can be taken up by shovels, put into barrows, and be taken away. The discharge of the mill is then again turned into the first reservoir, which fills, while a similar draining and removal of the contents of the second is taking place. In this manner the clay is more minutely divided and broken up, or tempered, than could possibly be done by the former process of hand labor, and in its soft state, when first moved, is in excellent condition for receiving finely sifted breeze, or any thing else that may be necessary for improving the quality or color of the brick. After this, all that is necessary for rendering the earth fit for the moulder, is a few days exposure to the air, to make it sufficiently dry for his use; and then the process proceeds exactly as before described, unless indeed a patent moulding machine should be employed, instead of a hand moulder, for forming the bricks, and then the compost is delivered to the machine, of which there are several varieties, said to produce more compact bricks than hand moulding, because greater pressure is exerted to compress the clay into the mould than can be exerted by a man working the whole day through.

All that now remains to be done, is the burning of the bricks, which is an operation of great nicety, because, if not burnt enough they will be soft and worthless, and, if over done, they vitrify, loose their shape, and often run together so as to be inseparable and useless. Accordingly, various methods have been adopted for producing the due degree of firing as it is called. In general, bricks are burnt, both in this country and in England, in a kind of building constructed for the purpose, and called a brick-kiln; but in London, the burning constantly takes place in the open air, the bricks being made up into immense quadrangular piles, consisting of from two to five hundred thousand bricks in each. The built kiln is thought by many to produce the best bricks, or at all events, a larger proportion of good bricks out of any given quantity, and must certainly consume less fuel; but as they are never adopted in the immense brick manufactories of London, where no pains or expense for conducting the concerns in the best and most advantageous manner is spared, this is evidence that there must be some objections to them; for if they possessed real advantages, there can be no doubt but they would be adopted.

A brick-kiln, as usually constructed, is formed of bricks built into a square form like a house, with very thick side walls, and a wide door-way at each end, for taking in and carrying out the bricks; but these doors are built up with soft bricks laid in clay, while the kiln is burning, and a temporary roofing of any light material is generally placed over the kiln to protect the raw bricks from rain while setting, and so made that it may be removed after the kiln is fired. The English kilns are generally thirteen feet long, ten feet wide, and twelve feet high, which size contains and burns 20,000 bricks at once. Wood is the usual fuel used in these kilns, and they are frequently built with partitions, for containing the fuel and for supporting the bricks, in the form of arches, as will be presently described. A brick-kiln has no flue or chimney, as its chief purpose is to direct the heat of the fire through the body of bricks piled above it. To effect this they must be placed in a particular form with great care, and this operation is called setting the kiln, and is performed by one or two men who understand the business, and to whom the raw bricks are delivered in barrows. The form of the setting is pretty nearly the same in the country kilns, or London clamps, except that in the latter, the arches are much smaller, because wood is only used for kindling, and not for burning.

The bottom of the kiln is laid in regular rows, of two or three bricks wide, with an interval of two bricks between each, and these rows are so many walls extending lengthwise of the kiln, and running quite through it; they are built at least six or eight courses high, so as to give the kiln the

appearance shown in *Fig.* 120, which is an end view of it. And this is permanent work, or work that remains in the kilns that have fire-places built in their floors, or has to be formed every time the kiln is set, when it has a flat bottom. The intervals between the walls are laid first with shavings, or light and dry brushwood, or any thing that will kindle easily, then with larger brushwood cut into short lengths, that it may pack in a compact manner; and, lastly, with logs of split hickory, or strong burning wood. This done, the over-spanning or formation of the arches is commenced; for this purpose every course of bricks is made to extend an inch and a half beyond the course immediately below it, for five courses in height, taking care to *skintle* well behind, that is, to back up, or fill up with bricks against the over-spanners. An equal number of courses, on the opposite side of the arch, is then set as before, and thus the arch is formed, which is called rounding, and is a nice and important operation, for if the arch fails or falls in, the fire may be extinguished, or many of the bricks above the arch may be broken. The intermediate spaces between the arches are now filled up, so as to bring the whole surface to a level, and then the setting of the kiln proceeds with regularity until it obtains its full height. In setting the kiln, not only in its body, but in the arches also, the ends of the bricks touch each other, but narrow spaces must be left between the sides of every brick for the fire to play through, and this is done by placing the bricks on their edges, and following what is called the rule of three upon three, by brickmakers, reversing the direction of each course as shown at *Fig.* 121. The kiln being filled, the top course is laid with flat bricks, so disposed, that one brick covers part of three others, which process is called platting.

The kilns of Philadelphia are constructed and managed in a manner very nearly according with the above description of the country kilns of England, but they are larger, having an average width of twenty-eight feet in the clear, and are higher; but the bricks are not laid more than thirty-five or thirty-six courses. There are seven arches or firing holes in the end, each two feet high by sixteen inches wide, and the distance between each arch is three bricks. Such a kiln holds 140,000 bricks, and consumes from forty to fifty cords of wood for burning them.

The kiln being built, or finished, the firing succeeds; and this is the most delicate operation, and one that requires practice. The fuel is kindled under the arches, but requires close watching and attendance, for being in a large body, it would burn violently and produce so sudden a heat as would crack and spoil the lowest bricks. To check the burning, the arch holes or mouths are closed with dry bricks, or even smeared with wet clay, in order to prevent the entrance of air, and rapid combustion that would ensue. The fire must be made to smother rather than burn, in order that by its gentle heat it may evaporate away the humidity that remains in the bricks, and produce drying rather than burning. The slow fire requires to be kept up about three days and three nights, by occasionally opening the vents, to supply air and additional fuel, and closing or partially closing them, until the fire gets up, as the workmen call it, that is to say, until it has found its way through all the chinks and openings between the bricks, and begins to heat those at the top of the kiln. To ascertain the progress of the fire, the top of the kiln must be watched, and as soon as the smoke changes color from a light to a dark hue, the drying is complete, and the fire may be urged. The first, or white smoke, called water-smoke, is, in fact, little else but the steam of the water while evaporating, and when that is gone, the real smoke of the fuel succeeds, and now the vents may be opened to admit full draught, and a strong fire kept up for from forty-eight to sixty hours; but the heat must not be white or so strong as to melt or vitrify the bricks, and whenever it appears to be increasing too rapidly, the vents must be partially closed. By this time the kiln, if it contains thirty-five courses, will be found to have sunk about nine inches; but the stronger the clay the more it will shrink, and it is by this sinking that the workman knows when the kiln is sufficiently burnt. The experience of burning a few kilns will show how much the clay of that particular place yields to the firing. When it is thus ascertained that the kiln is done, the vent-holes, and all other chinks through which air can enter, are carefully stopped with bricks and clay, and in this state it remains until the bricks are cold enough to be taken down, when they are distributed for use.

From the nature of the above process it will be evident that bricks of very different qualities will be found in the same kiln; for as the fire is all applied below, the lower bricks in its immediate vicinity will be burnt to great hardness, or, perhaps, vitrified; those in the middle will be well burnt; and those at the top, which are not only most distant from the fire, but exposed to the open air, will be merely baked, and not burnt at all; consequently, if they can be used, they must be reserved for inside work, that is not exposed to weather, or they will soon fail and crumble to pieces.

In the London method of open clamp burning, without any kiln, the piling and disposition of the bricks is the same as above described, except that the bottom arches are much smaller, as they are only intended to contain brushwood to produce the first kindling, and not for the future supply of fuel. No fuel is used except the breeze cinders and small coal before described, and this is distributed by means of a sieve, with wires about half an inch apart, over every course as it is laid near the bottom, and over every other alternate course, or every third course higher up in the kiln. The first layers of this fuel are from an inch to an inch and a half in thickness; but they diminish as they ascend, because the action of the heat is to ascend, consequently there is not the same necessity for fuel in the upper, as in the lower part of the kiln. The brushwood in the bottom ignites the lower stratum of fuel, and from the nature of its distribution, the vertical as well as horizontal joints will be filled with it, and thus the fire gradually spreads itself upwards, and the whole clamp is nothing but a mass of bricks and burning fuel. The heat is therefore much more generally distributed throughout the whole mass, and in order to confine it, the entire outside of the clamp is thickly plastered with wet clay and sand, the bottom holes being opened or shut as occasion may require for regulating the draught of air.

Notwithstanding the heat is much more equably distributed throughout this form of kiln, yet the

outside bricks all around receive very little advantage from the fire, and are never burnt; but being on the outside they are easily removed, and are reserved for the outside casing of the next clamp that may be built; and being then turned with their unbaked sides inwards, some of them become available. On taking down the clamp, the bricks are assorted, in London, into three separate parcels or varieties, according to their perfection and goodness. Those that are burnt very hard but have not lost their figure or shape, are called *malms*, or malm-facings, or malm-paviors, and are used for facing good work; or for paving, for which their hardness makes them peculiarly suitable. The main body of the clamp produces well burnt and regularly formed bricks called *stocks*, with which the generality of houses are built; and such as are imperfectly burnt, and are soft, are called *place* bricks. These last are used for inside partitions, backing walls that are to be plastered upon, and other work that is neither exposed to the eye or the weather. These several varieties of brick have each a separate price, the best being worth almost twice as much as the worst. If the fire has not been carefully attended to, and has been permitted to get too violent, a few of the lower bricks will become distorted by partial fusion, and may fuse and adhere together, when they are called clinkers, and are useless for building purposes, but form an excellent road material. In this country the names of bricks are different, but derived from the same source, being called hard burnt or arch bricks, body bricks, and soft or salmon bricks; though this last name is generally altered by workmen into sammy. The goodness of a brick is derived from its regular shape and appearance, its tenacity and hardness, its sound, and by its not absorbing water, or being affected by frost. The tenacity and hardness are judged of by striking one brick against another, or letting them fall upon stone pavement. Good bricks should have a sound approaching to that of a metal when so treated, and they ought to ring, and bear a very hard blow with the edge of the trowel, before they divide. If they readily break with a blow, or crumble to dust by a fall, such bricks are of the soft or sammy kind, and are unfit for introduction into a heavy wall, particularly on the outside of it, as they will be sure to be attacked by frost, and crumble to pieces. The absorbency of bricks is judged of by weighing them in the dry state, and then soaking them in water for an hour, and weighing them again. Those bricks that take up the greatest quantity of water, are the least fit for use, when they are to be exposed to its action. The average weight of a sound and dry London stock brick, is four pounds fifteen ounces averdupois.

ON THE HUSBANDING OF FARM-YARD MANURE, AND ON OTHER RURAL SUBJECTS.

To Thos. Wm. Coke, Esq.

HONORED SIR—After the minute inquiries into the subject of manures, and the copious elucidation thereof upon chymical principles, carried on and developed by able philosophical men, it will appear presumptuous in me (a humble individual, having no pretension to scientific knowledge) thus taking up the pen, and attempting to follow such high authorities in explanation, and even in some respects advancing opinions at variance with theirs.

But, sir, as the published reports of those eminent men's labors rarely fall into the hands of practical farmers, and are but imperfectly understood by them, I am induced to step forward, and endeavor to express my ideas upon a subject so important to agriculturists, in a plain manner, and not liable to be misunderstood by practical men, to whom the following hints may prove more acceptable, from being the result of practical experience, and not founded on theory alone.

Although I address myself to you, sir, at the present moment, I may in fact be considered as attempting to explain my sentiments to the numerous, intelligent, and highly respectable tenantry upon your extensive *Norfolk* estates, men whose liberality will, I am convinced, excuse me in any harsh expression which may drop from my pen while attempting to deliver my sentiments upon a subject with which their respective interests are inseparably connected. Some men, who have had the advantage of superior information, will consider the greater part of the following observations as extraneous, unnecessary, and perhaps uncalled for; and to such men they actually are so: but they will please to recollect, there are many very meritorious occupiers of land, who have not had the same means of obtaining information upon agricultural subjects, and that to such persons the following hints may be of service; and I may be allowed the privilege of saying, without much fear of contradiction, that it sometimes happens, where farmers have, by means of precept, example, or dint of experience, obtained a competent or even superior agricultural knowledge, they do not always practise to the extent of their information. *A monitor is a wholesome physician for the frailties of human nature, though not always an acceptable one.*

I will now, Sir, enter upon my subject, and will, with your permission (with a view to ease and freedom in expression) consider myself as addressing my remarks to your tenantry.

I will not attempt to enter upon the wide range of manures *generally*, but confine my remarks *more particularly* to what has been aptly termed the Farmer's Sheet Anchor, FARM YARD MANURE.

My observation and experience justify me in stating, that the husbanding of farm yard manure is (generally speaking) either imperfectly understood, or not sufficiently attended to in the county of Norfolk.

The principal error in the common method of manufacturing farm-yard dung, in Norfolk, originates with the prevalent custom of keeping the dung arising from different descriptions of animals in separate heaps or departments, and applying the same to the land without intermixture, and in an improper state.

It is customary to keep the fattening neat cattle in yards by themselves, and the manure arising from them is of good quality, because the excrement of fat cattle is richer than that of lean ones: fattening cattle are fed with oil-cake, corn, Swedish turnips, or some other rich food, and the refuse and waste of such food thrown about the yard, increase the value of the manure; it also attracts the pigs to the yard. Those industrious and useful animals root the straw and dung about

in search of grains of corn, bits of Swedish turnips, and other food, by which means the manure in the yard becomes intimately intermixed, and is proportionally increased in value. The feeding troughs and cribs in the yard should (for obvious reasons) be shifted frequently.

The *store* neat cattle are also kept in yards by themselves. The manure arising from them is of a very inferior description, and it frequently happens that a superabundance of straw is thrown out of the barn at one time, more than the stock in the yard can tread down properly: besides, there is not now the same inducement for pigs to root the straw about in the yard as there was previous to the introduction of threshing machines. The barn door in the *store* cattle yard is now the principal attraction for pigs, and they in a great measure neglect the other parts of the yard, unless where the stock of pigs kept is so large that they are compelled, by the imperious law of necessity, to seek out for their sustenance in a more distant and less productive station than immediately at the barn door.

The horse dung is usually thrown out at the stable doors, and there accumulates in large heaps: it is sometimes spread *a little* about, but more generally not at all, unless where necessary for the convenience of ingress and egress, or perhaps to allow the water to drain away from the stable door. Horse dung lying in such heaps, very soon ferments and heats to an excess: the centre of the heap is burned or charred to a dry white substance, provincially termed *fire fanged*. Dung in this state loses from 50 to 75 per cent. of its value. The diligent and attentive farmer should guard against such profligate waste of property. The remedy is easy, viz. by never allowing the dung to accumulate in any considerable quantities at the stable doors: suppose it was an established rule that every day, as soon as the yard-man has gone through his regular routine of morning's work, such as foddering cattle, feeding pigs, &c. he should take a horse, or some other draught animal, with a light cart, and remove the horse dung from the stable doors, and spread it about the *store* cattle yards. To this plan will be objected the pleas of trouble and expense: in answer I have to say, *trouble* should never be considered by industrious farmers; and I think I can readily prove, there will be no additional expense in carrying the plan into effect. The yard-man having finished his morning's work of foddering cattle, feeding pigs, &c. seldom does more than idle about the yard, and leaning upon his fork until the stock require a second supply of food. His spare time would be more beneficially employed in removing the horse dung, which, at most, would not be more than half an hour's job of a day. There generally is, or always ought to be, about every farm premises, a light cart, for what is called *odd jobs*. These carts will be very suitable for removing the horse dung; and as to animals to draw those carts, there are few farms without having one or more idle horses, or other beasts of burden, upon the establishment; such, for instance, as a favorite old hack-horse, a mule or pony to carry the errand boy, a mare that has a foal, or a horse *a little* lame, and not fit for constant work, an old working ox turned off to fatten, a bull, (where one is kept) a little gentle work would do him good, insomuch it would keep him more quiet in the pasture; or even suppose the master or mistress's gig horse was used occasionally for half an hour of a day at dung cart (when not otherwise wanted) would be of great service in so far as keeping the horse in regular exercise, and by that means prevent fatal accidents which frequently happen where high-spirited gig horses are not kept in constant exercise.

The dung from the feeding hog sties should also be carted and spread about the *store* cattle yard in the same manner as the horse dung.

Opinions are much at variance as to the proper form of dung yards: some theorists recommend the yards to be made so much concave as almost to amount to a well shape, giving as a reason in support of their opinion, that the virtues of dung can only be preserved by being saturated in urine, or some other moisture. Others again assert, that dung yards should be formed convex, and assign as their reason, in support of that form, that farm-yard dung should be kept dry. Practical experience points out that a medium between those two extremes is the best, and a yard a little hollowed is the most common shape.

Much has been said and written upon the subject of the valuable properties of urine, and of the weepings of farm-yards, as manures for grass land. It has been recommended to collect the whole wash of the farm-yard in reservoirs, and to convey it from thence into the fields in water carts; but this theory should not be reduced into practice unless it is conjectured that the benefit to be derived from the manure so conducted covers the expense.

It is a good method (where situation will admit of the practice) to collect the wash of farm-yards into tanks, where a body of water can be thrown into it sufficient to effectually irrigate some adjoining piece of grass ground, situate upon a lower level. It is also an advisable method to throw litter, scourings of ditches, and such other refuse into the tanks, in sufficient quantity to absorb the urine and wash off the yards which run into them. Compost, so collected, is admirable top dressing for permanent grass lands, or for young clover lays.

But to revert to the subject of farm-yard dung: it is a common practice (previous to the dung being drawn out of the yards into the fields intended for turnips) to prepare what are called *good bottoms* for the reception of the muck. This is done by collecting considerable quantities of clay, marl or such other material, in heaps where the dung is to be placed—these bottoms are formed to the squares (length and width) of the intended dung heaps, and are from 12 to 18 inches thick. This in done with an idea that the juices of the dung will *descend* into the bottoms. (The fallacy of such reasoning will be pointed out hereafter.) The bottoms being prepared in the fields, the dung is then carted to them from the yards: in this operation, the materials of the bottoms is pressed down very close, by reason of the carts constantly turning upon them when delivering their loads; the carts are tipped up, and the dung shot out. Men are placed at the heaps, who throw the dung up *lightly* with forks to the height of five or six feet making the heaps to cover the square bottoms previously formed. In clearing the yards, it is customary to begin on one side of a yard, going regularly forward, until it is emptied, and then begin on a

second, by which means the dung arising from different descriptions of animals is kept apart, and is ultimately applied to the land without intermixture, and as to the horse dung, *the residue of it* which is left from fire-fang and charring, is considered strong dung, and as it is generally understood that a smaller portion of it than of common yard dung will answer the intended purpose, it is usually (as a point of economy) to save carriage, taken to the most distant parts of the farm, and this very frequently without any reference to the nature of the soil (whether clay or sand) to which it is to be applied.

Dung heaps formed in the manner I have described, (when the dung is good for any thing) very soon ferment to a violent degree. The gasses ascend and evaporate: the juices, alas! in place of descending into the hard beaten clay bottom, as was expected, ooze out at the side of the heaps, and are soon dried up and lost. In a short time the fermentation subsides, and leaves the centres of the heaps burned or charred, while the outsides of the heaps are dried up to chips by the natural effects of sun and wind. In this state these miserably mismanaged heaps of dung remain until the near approach of the turnip sowing season; they are then turned over, and the clay bottoms mixed with the dung; a partial fermentation succeeds, (and this turning and mixing the bottoms form the only rational part of the manufacturing process,) for by this improvident system the quality of the dung is not only materially deteriorated, but the quantity very much so, that by the time the farmer has sown half his turnips, he finds his dung expended: he has then recourse to oil-cake, or perhaps sows a part of his turnips without any manure at all. If the soil is of a nature to produce turnips almost spontaneously, there will be a crop even under the worst management; but when not of that happy admixture, and managed as I have before described, it follows as a matter of course that the crop fails; nevertheless the farmer is so much of a philosopher, that he consoles himself with the idea that he has done his duty by the land, believing that it is naturally so *unkind for turnips*, that it would be a perfect miracle if he was to have a good crop of them upon such land.

And here I must beg leave to apologize for the high coloring of the foregoing strictures. It is certainly neither my wish nor intention, more than my duty or interest, to give offence to the respectable body of men to whom I may be considered as applying the foregoing observations; but I consider it in some degree necessary for my purpose to rouse the feelings *to a spirit of inquiry*, and having done so, I ask the candid observer to take an impartial view of the subject, and say whether these things are so? I may be told, that to speak the truth is in some cases a libel; if so, I stand convicted; however, if in speaking the truth in the present instance, I provoke an inquiry which may in the result terminate to the advantage of the parties concerned, I shall consider myself a fortunate railer indeed, however uncourteous my remarks may appear. As it is a failing in human nature to too frequently misinterpret our friends' best intentions, particularly where people cannot bear to be told of their faults; and as it is more easy to see others' faults than one's own, I will take it for granted, that the majority of the readers of the foregoing observations consider them more applicable to their neighbor's system of management than to their own. I am, however, not without hopes, that some few liberal minded, unprejudiced men, will acknowledge at once that the cap fits themselves, and *from such men I entertain the greatest hopes of improvement.*

Having pointed out what I consider the principal errors in the prevalent or common method of husbanding farm-yard manure. I will now endeavor to explain my ideas of what I consider a more perfect system and if I am correct in the opinion I have formed on the subject, I will venture to say, there can be no difficulty in producing *upon the farm* a sufficient quantity of yard muck or compost to manure the whole of the turnip land upon any farm, in a medium state of fertility, cultivated upon the four-course husbandry; and if my premises are correct, the occupier may then reserve the whole of his stipulated quantity of oil-cake for his wheat crop, that description of manure being certainly more adapted to the wheat than to the turnip crop.

As the great object I aim at in the following hints is to improve the quality as well as to increase the quantity of farm-yard manures, I strongly recommend, indeed I consider it indispensably necessary, that all descriptions of farm-yard dung should, in the first instance, be as intimately mixed together as possible, and that particular attention should be paid to the husbanding of the horse dung, which should without fail be removed *daily* into the store cattle yards in the manner I have previously recommended. An abundant stock of pigs should always be kept in the yards—no dry straw should be left to blow about the stack yards; all should be brought into the cattle yards. Nettles, thistles, and other coarse weeds (not in seed) should be brought into the yards, and not allowed to die and waste in the fields and ditches when they are cut down. The horses kept on the farm should be fed with green food in the yards in the summer months, and they should also be allowed to run loose in the yards in winter, having stables or sheds to go into at pleasure. The yards, stables, and sheds should at all times be kept well littered with straw. The soap lees from the farm-house should be carefully preserved, and thrown upon the dung in the yards—saw-dust, leaves of trees, road scrapings, scourings of ditches, in short, all animal and vegetable substances should be carefully collected and thrown into the farm-yard.

When it is found necessary to empty the dung yards *early in the season*, whether with a view to make room in the yards, to expedite spring work, or employ the teams in unfavorable weather, when they could not otherwise be employed to advantage upon the farm, I recommend that preparations should be made in the usual manner for the reception of the dung heaps in the intended turnip fields, viz. by collecting large heaps of clay, marl, or such other material. The bottoms for the heaps should not be laid above six or eight inches thick of the material, and a large quantity of it to be placed in rows on each side of the bottoms marked out—the dung should then be drawn out of the yards, and placed upon the bottoms, but not in the usual way of throwing it up *loosely to cause fermentation*, on the contrary, by drawing the carts with their loads *upon the heaps*, for the purpose of compressing the dung, and thereby *preventing*

fermentation. One or two men (according to the number of teams employed, and distance from the yards) should remain constantly at the heaps while the teams are at work, on purpose to spread and level the dung regularly, so as to render the ascent easy for the succeeding teams as they come with their loads.

If the dung has not been previously mixed in the yards, it should be so in drawing to the heaps, by means of taking up a few loads from one yard, and then a few from another, alternately, and even from the same yard the loads of dung should be taken from different parts alternately, by reason that the dung is not of equal quality, nor made with the same regularity, in all parts of the yard.

The coal ashes, road scrapings, and all other collections of manure about the farm house, should also be carried to the dung heaps in the fields; and when the heaps are raised as high as convenient for the horses to draw up, several loads should be shot up at the ends of the heaps, for the purpose of making them up to the square of the centre: the whole heaps should then be completely covered with the marl and clay, or soil previously collected in rows by the sides of the heaps; and if there should not have been a sufficient quantity of material collected in the first instance, more should be got ready without loss of time, so as to effectually enclose the the dung heaps in *crusts*, and they are thenceforth denominated pies. The dung will be preserved in the pies in a very perfect state, with little or no deterioration or diminution without fermentation, and without loss by exhalation or evaporation. The pies should remain in this state until within ten days or a fortnight of the time the manure will be wanted for the turnip ground, when they should be turned carefully over, and the crust, top, bottom, and sides intimately mixed up with the dung: when the turning is completed, immediately plough several furrows of the natural soil all round the heaps, and with the loose earth ploughed up, again coat the heaps all over; the pies will then take a gentle fermentation; the earth intermixed with and covering the dung will absorb the juices and gasses of the dung, and the compost come out in a fine state of preparation for using on the turnip land.

When turnips are sown in the Northumberland ridge system, the drills should be split open, the dung taken from the pies, and spread in the rows, then covered up, and the seed sown immediately in the fresh earth—the whole operation should, if possible, be completed in the same day, when every ridge or drill forms a little hot-bed, to encourage the vegetation of the plants and force them speedily out of the reach of the turnip flies.

When dung is taken out of the yards late in the sping, or only a short time before it is wanted for the turnip ground, the preparation should in some degree differ from the foregoing, because of the pies or compost heaps having less time for incorporating. I recommend the following process for preparing dung late in the spring. First let the bottoms and side heaps of earth be provided, in the same manner as for the winter heaps, but the dung should not be carted upon the heaps to compress them, and prevent fermentation as in winter; on the contrary, the dung should be thrown up lightly with the fork, upon the bottoms, and the side heaps of earth mixed intimately along with the dung, which answers the double purpose of reducing the straw part of the dung to a prop state for applying to the land, and prevents an e cess of fermentation in the centre of the heap When the heaps are raised sufficiently high, a extended to cover the squares of the bottoms pr pared, the natural soil of the field should be plough ed up all round the heaps, and thrown upon the in the manner heretofore directed; the pies w then take a gentle fermentation, and soon be rea for use. The time required for preparing the m nure in this manner must depend upon the streng of the dung, and the quantity of the clay or ma thrown up along with it. Experience will soon po out the proper quantity of marl to be applied, a the necessary time for the pies to remain bef they are used. Turf turned up for a year preceding on wastes by the sides of roads, makes excell pie meat. Good compost heaps applied to la have the effect of renovating soils worn out arable culture and stimulating manures.

Objections (on the score of expense) will raised against the system I have recommend but when it is considered that the greater part the additional expense is in manual labor, sur that objection should have no weight in the sc when weighed in balance against the ultim benefit to the farmer, and the highly credita method of employing the superabundance of borers, or excess of population with which landed interest is at present burthened; in pre ence to the customary method of supporting extra laborers and their families as paupers which is much the same thing, employing s laborers in what is called repairing the roads, is (according to the common practice) throw the *dirt* from the sides into the centre, and th by creating a *job* for some other persons to th the *dirt* out again.

This remark leads me to make a few obser tions on the subject of road making, a sub that although it forms an integral and princ part of rural economy, is but seldom much att ed to by those whose interests are most intima concerned in having good roads.

In a country like Norfolk, where the soil is g rally light and dry, and good materials freque plentiful, much less expense, attention, or ing ity is required to keep roads in good order, tha districts less favorably circumstanced, and greater part of the roads in Norfolk are kept in order; but there are, I am sorry to say, (I s feelingly) *some very striking exceptions to th neral rule.*

The following are prevailing errors in the formation of roads, viz., omitting to under springy lands, or retentive subsoils, not carr off (by side drains) the surface water arisin the adjoining lands through which the roads and in neglecting the *inclined plane*, or fall the water *length-ways*, of the road.

Some eminent scientific men have differ opinion respecting the form of roads, viz., ther a *concave* or *convex* form is most proper both opinions may be supported by well-fou arguments. The vestiges of the Roman left in this country indicate that that wise p formed their roads upon the inclined plane *concave* principle. In modern times the celeb Bakewell, of Dishley, in Leicestershire, (w memory will long be revered by agriculturist breeders of farm stock,) was a great advoca

concave roads, as was also his cotemporary and intimate friend Mr. Wilkes, of Measham, in the county of Derby: under the patronage and by the direction of those two eminent men, several well-formed *concave* roads were made and completed in the midland counties. Those roads have now stood the test of many years experience, and the principle on which they were made has been subsequently followed by practical men in those counties. In some instances the hollow or concave roads have failed, where they were made with bad materials, upon wet bottoms, not thoroughly underdrained; but in general they are found to answer much better than high convex roads. because, a heavy-loaded four-wheel carriage, passing along the centre of a *concave* road, presses an equal weight upon the wheels; and as the middle of the road is the lowest, the pressure inclines to the centre, consequently does not shake or loosen the frame of the road. Not so in a convex road, when raised in a high arch (which is frequently the case) for it is impossible to keep a heavy-loaded carriage in a direct line along the middle of such a road, the carriage naturally veers to one side or the other, and the greater part of the weight of the load hangs upon one wheel, which not unfrequently breaks down from such unequal pressure. The road is also cut into deep ruts; those fill with water from the first shower which stagnates in the ruts, and saturates the road to the foundation. The succeeding carriage wheels jam into the ruts, cut them still deeper, shake the road to its centre, if not cut it quite through.

Convex roads ought to be very well made with good materials, and particular attention should be paid to keeping the ruts well filled up, so as to cause the water to fall over *the sides* of the road, for it seldom happens that the projector of a convex road considers it necessary to pay any attention to the fall for the water length ways of the roads: his ideas are rivetted to the principle that water will not stand upon a round road, and so far correct, were it not for the ruts, which for the preceding reasons *must* take place.

A concave road is less liable to have ruts, and requires less attention in keeping in repair than a high convex one: the water naturally runs along the inclined plane from the higher to the lower levels, and then forces its way into the side drains.

There are also many well founded objections against roads being made two much concave, but it is not necessary to mention them at present, as the principal objects of these remarks it to point out and endeavour to correct the prevalent error of raising carriage roads so high in the centre, which is carried to such an excess in some instances as to endanger the lives of the passengers who venture to travel upon them.

The form I recommend is a medium between the two extremes: the road may be a little elevated in the centre, but I consider the principal object which should be attended to in the formation of roads is *the inclined plane*, or fall for the water longitudinally of the road, and this is so absolutely necessary, that where the road has to pass over a level or dead flat (which seldom happens) the bed of the road should be formed with an artificial rise and fall. When the road passes down a long descent of ground, it should be so formed as to lead the water into the side drains at short distance, thereby preventing the water from guttering, which it would do if allowed to run any distance upon the road. When the bed of the road is first formed, it should be well rolled or carted upon, and all irregularities filled up; the hard material should then be laid on in a sufficient body in the first instance, for it is a bad method to begin with a temporary covering, which would soon cut through, sink into the bottom, and be lost. The large stones should be carefully broken into small pieces, otherwise they will not cement together. A principal error in the Norfolk method of repairing roads is in laying on field stones without breaking. A moment's reflection will shew that large *round* bodies *cannot*, and that small acute angles *will* unite to form a firm base. When large round field stones are broken small they form acute angles; those joint in with each other, and take an equal bearing of the pressure which comes upon them: not so with unbroken round stones; they always remain loose, and carriage wheels pass *through*, not *over* them, as they ought to do, which causes very great additional draught, and when such stones are put upon high cobling roads it renders travelling very unsafe for a time, until the stones are pushed over the sides of the roads by the carriage wheels, and thereby leaving the centres of the roads in much the same state as before they were attempted to be repaired, with all the time, labor, and expense lost.

Another custom, which cannot be too severely censured, is the imprudent and improvident system of laying bad materials upon roads, when good materials can be conveniently obtained. It is not uncommon to see perfect dirt or sand laid upon roads, which adds fuel to fire, and makes the roads worse than before. The error of this system may be readily explained by calculation.

Suppose the distance from the gravel pit to the part of the road intended to be repaired is one mile; a team, carrying six loads per day, travels twelve miles, exclusive of the distance going to and from work. I calculate the expense of a team of three horses, with a man to drive, including wear and tear, at 14*s.* per day, and the expense of digging and filling the gravel at 4*d.* per load, making the whole expense 16*s.* per day for doing no good whatever, but on the contrary, doing a great deal of injury, viz. by cutting up one part of the road by the carriages passing along it in attempting to mend another part; or, in fewer words, make two holes in trying to stop one.

Now, suppose that an additional 4*d.* per load was allowed for the gravel; it would then be riddled, and I maintain that *three* loads of *riddled* gravel will be more efficacious in repairing roads than *six* loads of unriddled, consequently half the carriage saved.

The comparative statement will then stand as follows:—

	£	*s.*	*d.*
To six loads of *unriddled* gravel, and a team for *a day* carrying the same	0	16	0
To three loads of *riddled* gravel, and a team for *half a day*, carrying the same	0	9	0
Saved per day, by using riddled gravel	£0	7	0

Besides less injury done to the roads in carting, and what is still of much greater importance, the farmer having his team only half the time employed upon the roads, and the other part of the time to be beneficially employed upon his farm.

Mending the roads is sometimes used as a plea in extenuation of the injurious practice of picking the stones off the land: but I consider the plea inadmissible, because where there are many gravel stones on the surface, it is a sure indication that a gravel pit may be opened to an advantage at no great distance: but a still greater objection rests in the injury the land sustains from such treatment, particularly light soils, the staple of which is weakened, and the intrinsic value reduced in a very material degree, by having the stones picked off; indeed I affirm, that no stones should ever be picked off sandy or gravelly soils, (and but seldom from any other description of soils,) unless when the stones are so large as to impede the progress of the implements necessary to be used in the cultivation of the soil. Clovers and grasses intended to be mown should always be rolled down at a proper season, after the larger stones are picked off.

It is a disgusting practice, and cannot be too severely censured, to pick the field stones into heaps in the fields, and there allow them to lay, as is frequently the case the year round. This practice is unpardonable in the highly-cultivated and justly-celebrated county of Norfolk, a county to which most others in the kingdom look up to for example. Yet, notwithstanding the general proficiency of the Norfolk farmer, I may justly apply to them the adage of "*use is second nature*," (let it be remembered I speak in general terms, for there are very many exceptions) in respect to the stone heaps; for the farmer rides over his fields amongst those heaps of stones with seeming unconcern, as if unconscious of the injury he has sustained by having had the stones picked off his land in the first instance, and afterwards by their being left in heaps in the fields to destroy the herbage they lay upon.

In this state the stones lay from month to month; nay, from year to year; and there are instances (though not frequent) where the stones are not removed at all, but are spread about again, and ploughed down when the land is to be broken up in preparation for the succeeding crop of corn.

With this severe (I am sorry to say) well founded reproach, I conclude my present remarks. In my hints upon the different subjects I have here alluded to, I have endeavored to point out a few errors, with a view to correct and improve them. Although my remarks appear to be, and are in fact, a little severe, yet I trust the liberal-minded Norfolk farmers will receive them as (they really are) *well intentioned.* Those gentlemen may rest assured, that although I have considered it a duty incumbent upon me to point out a few prominent errors, there is no person more sensible of their general merits than I am, and no one more ready to bear testimony to their indefatigable industry, intelligence, and general good practice as agriculturists, and as this I may safely say, without any fear of being reproached as a flatterer by any person who has read the foregoing remarks.

To Thomas William Coke, Esq.

I beg most humbly to state—You, sir, will, I fear, consider that in the foregoing remarks I have done but imperfect justice to the task I had undertaken.

It is, I acknowledge, a bold measure in me thus venturing to censure any part of the celebrated Norfolk husbandry; the principal improvements of which (as has been very justly remarked by a high authority) were *undertaken, matured, and perfected*, through the instrumentality of your patronage, precept, and example.

But although it is generally allowed that the system of husbandry followed in Norfolk is very *nearly* perfect, (more particularly where it has felt the immediate effect of your fostering hand,) I trust, sir, your liberal mind will excuse me when I venture to say, there are still a few errors or imperfections, which strikes strangers more forcibly than they do the eye of the actual cultivators. Some of those errors have been hinted to me, and I have here endeavored to point a few of them out, and to suggest remedies for their improvement.

It will remain for you, sir, to judge of the merits (if there are any) or demerits of my performance, which I now venture to lay before you.

I am, honored sir,

Your very humble and obd't. servant,

FRANCIS BLAIKIE.

MOWING.

From the Farmers' Cabinet.

They who have not been in their youth accustomed to do this work, are seldom found to be able to do it with ease or expedition. But when the art is once learnt, it will not be lost.

As this is one of the most laborious parts of the husbandman's calling, and the more fatiguing, as it must be performed in the hottest season of the year, every precaution ought to be used which tends to lighten the labor. To this it will conduce not a little, for the mower to rise very early, and be at his work before the rising of the sun. He may easily perform half the usual day's work before nine in the morning. His work will not only be made easier by the coolness of the morning air, but also by the dew on the grass, which is cut the more easily for being wet. By this means he may lie still and rest himself during all the hottest of the day, while others who began late are sweating themselves extensively and hurting their health, probably, by taking down large draughts of cold drink to slake their raging thirst. The other half of his work may be performed after three or four o'clock, and at night he will find himself more free from fatigue.

If the mower would husband his strength to advantage, he should take care to have his scythe and all the apparatus for mowing in the best order. His scythe ought to be adapted to the surface on which he mows. If the surface be level and free from obstacles, the scythe may be long and almost straight, and he will perform his work with less labor and greater expedition. But if the surface be uneven, cradley, or chequered with stones, or stumps of trees, his scythe must be short and crooked. Otherwise he will be obliged to leave much of the grass uncut, or use more labor in cutting it. A long and straight scythe will only cut off the tops of the grass in hollows.

A mower should not have a snead that is too slender, for this will keep the scythe in a continual tremor, and do much to hinder its cutting. He must see that it keeps perfectly fast on the snead; for the least degree of looseness will oblige him to use more violence at every stroke. Many worry themselves needlessly by not attending to this circumstance.

Mowing with a company ought to be avoided by those who are not very strong, or who are little used to the business, or who have not their tools in the best order. Young lads who are ambitious to be thought good mowers, often find themselves much hurt by mowing in company.

Mowers should not follow too closely after each other, for this has been the occasion of fatal wounds. And when the dangerous tool is carried from place to place, it should be bound up with a rope of grass, or otherwise carefully secured.

STEAM PLOUGH.

Among the new inventions in France is one which is much talked of among speculators and manufacturers. It is a steam plough of very peculiar construction, with which it is said four miles of ground can be excavated with an engine of only eight-horse power, to the depth of a foot and the breadth of two feet, in a single hour. The projector of the canal from Orleans to Nantes, which, under ordinary circumstances, would require at least five years for its construction, pretends that in one year the whole would be completed by the use of this machine, and that the saving in mere interest of capital would amount to forty thousand pounds sterling. A friend of mine, who is one of the best engineers in Europe, tells me that he has seen the instrument, and that with some ameliorations he believes it would accomplish all that has been stated. The earth as it is turned up is thrown into a sort of sail, which throws it to a distance of sixty feet.—*Letter Corr. Gardener's Gazette.*

To the Editor of the Farmers' Register.

Williamsburg, 1st July, 1839.

Dear Sir.—The two papers accompanying this, were compiled for my own gratification. If you think them of sufficient interest for publication they are at your service.

I offer you my friendly salutations,

RICHARD RANDOLPH.

REMINISCENCES OF JAMES TOWN.

Capt. Smith informs us that the first colony landed at Jamestown *for the first time*, on the 13th of May, 1606. It is represented as a peninsula at that time. Misfortune met them at the threshold; for on the return of the first expedition up the river, they found seventeen men wounded, and a boy killed by the *salvages*. Encountering sedition, pestilence and famine, they persevered until they established a town; and commanded respect from the Indians. In January, 1640, it was ordained, that "James Cittie be the chief town," and the governor is to reside there. In 1642 *decent houses* were built in the town. In 1655 Sir William Berkley, governor of Virginia, conveyed to Richard Bennet, esq., "the westernmost of three brick houses," which he built there. A weekly market was established, to be held every Wednesday and Saturday. In 1662 an act of the assembly provides, first, that a town be built at James City; that the town to be built shall consist of thirty-two houses of brick, forty-two feet long, and twenty feet wide, within the walls, eighteen feet high above ground; the walls to be two bricks thick to the water table, and a brick and a half from thence to the roof. The roof to be fifteen foot pitch (a Dutch roof) and covered with slate, or tile. 2ndly, The houses shall be built regularly, one by the other in a square, or such other form as the honorable Sir William Berkley shall appoint. 3rdly, That each county shall build one house. In the same year an act past for building a church; and we may presume that the venerable brick relic of a church, which is now to be seen there, was built in obedience to that act.

The records show that the island extended much farther westward than it does now; and we have good cause to believe that the land on which many of these houses stood, is now under water.

I have before me a manuscript account of Bacon's rebellion, said to have been written by one of the members from Stafford, in the assembly held at James Town in June, 1676. This account may be substantially true; but it certainly contains many errors. It states that Bacon was unanimously chosen a member, and was taken prisoner on his way to that assembly: that he saw him in his seat as a councillor, when the assembly was in session, of which he was a member. There is no instance of a man's being both burgess and councillor at the same time. It also states that Sir William Berkley issued a proclamation against Bacon and others, prior to the 5th of June, 1676, when Bacon went down to take his seat in the assembly. That assembly passed "an act disabling Edward Hill and John Stith to bear office." This act charges *them* with being the *greatest fomenters* of the late disturbances; the writer of the above article states that Edward Hill was a member of that assembly. It is not probable that Bacon would have been so unguarded as to go to the legislature when he was proclaimed an outlaw.

The first overt act "*against his sacred majestie*" was in June, 1676, when he caused James Town to be burnt. The act passed in February, 1677, states, that Lawrence and Drummond were among the most notorious aiders of Bacon. Now Lawrence and Drummond are charged with burning James Town, and it does not appear that they were concerned with Bacon, *prior* to June, 1676. The strongest presumption is, that the proclamation against Bacon was issued *after* his attack on James Town. It is averred that he died in the autumn of that year.

BACON'S REBELLION.

An article under this head, published in the Petersburg Intelligencer, states, that Nathaniel Bacon (called the rebel,) was a member of the council. I doubt it. Where is the evidence? The first official notice of his name, appears in an act of assembly passed on the 5th June, 1676,

where he is recognised as general, and commander in chief of the army, raised by an act of assembly, passed two months before.

It does not appear *when* he was commissioned. He lived in the county of Henrico. You will find in the office of the county court of Henrico, a deed from Randolph to Randolph, dated 1st November, 1706, for a tract of land called Curles, lately belonging to Nathaniel Bacon, esq. dec'd., and since found to escheat to his majesty. His confession commences, "I, Nath. Bacon, of Henrico." (See Henning's Stat. at Large, 2nd vol., p. 543.)

Col. Nathaniel Bacon, of York county, was a member of the council in 1658. (See 1st Henning, p. 499.) and of the house of burgesses, in 1659, (see 1st Henning, p. 506,) and president of the council in 1690. (See James City records.) He died on the 16th of March, 1692, in the 73rd year of his age. (See tomb stone on King's Creek.) He married Elizabeth, daughter and heiress of Richard Kingsmill, of James City county; they left no children, and by his will (in general court) he gave his estates to his niece *Abygall* Burwell; his riding horse, Watt, to Lady Berkley, at that time the wife of Philip Ludwell. Lady Berkley was, when Sir William married her, the widow of Samuel Stevens, of the county of Warwick, who settled on her a large estate; and as Sir William left her all his estates, she was very wealthy when she married Col. Ludwell, whose family inherited the mansion at Green Spring, with other valuable and extensive possessions. The tomb stones at James Town are permitted to go to ruin, and the grave of Mrs. Paradice, (the last of the Ludwells, who left a large estate for her heirs,) has nothing to designate it.

Williamsburg, June, 1839.

THE PROSPECTS OF THE MULTICAULIS CROP.

From the Journal of the American Silk Society.

We do not intend, and hope we shall not be suspected of a design to stimulate speculation in morus multicaulis. Our object is to give such information as we are able to collect from different quarters of the country in relation to the growing crop of trees. So far, our information leads us to the conclusion that there will not be more than one-fifth as many trees grown as there have been buds planted. We have information of entire plantations having utterly failed; of others that have not produced more than one tree for every ten buds planted; of others again that bid fair to yield two-thirds, and some few others that will produce one-half. Not more than two plantations have been heard from by us that have yielded seventy-five trees for every hundred buds planted. On carefully comparing these accounts we have arrived at the conclusion, that in the whole country there will be raised not more than one-fifth as many trees as there have been buds planted. We have been repeatedly applied to for the cause of this great failure. As we of course could not have been present every where, we cannot even guess at the cause of failure in any particular case. Some persons have supposed their failures were caused by steeping the cuttings in water before planting. This we do not believe. Cuttings that were too *far gone* before they were steeped would certainly be hastened in their progress to decay by the water; but those that had life enough left to save them under any circumstances would certainly be benefited by it. Gardeners who propagate roses, &c. by cuttings, understand the value of putting the cuttings in water a few hours before planting them. Others attribute the failure to early planting, others to late planting; some to deep planting and some to shallow planting. But the great body of cultivators attribute it to the peculiarly unfavourable season, and bad condition of the cuttings. The two latter reasons we are inclined to think are the true ones. We have seen cuttings planted that were perfectly dry—as dry as our walking stick, and we should as soon have expected a crop of walking canes to have grown from our old *sweet gum* laid in a furrow, as we should a crop of morus multicaulis from some cuttings we have seen planted this spring.

We at present consider the prospect of the prices of trees in the fall to be decidedly good—even better than at this time last year. G. B. S.

LARGE COCOONS.

From the Journal of the American Silk Society.

We were shown a sample of cocoons on the 11th of June, produced by Mr. Richardson, of this city, that exceeded any we ever before saw, for size, weight and texture. There were nine cocoons which weighed collectively, 339 grains an average of 37⅔ grains each, or a fraction less than *one hundred and fifty-three to the pound.* The heaviest cocoons we ever before saw, were 175 to the pound. The above mentioned cocoons were the produce of eggs imported this spring from France, and were of the three kinds called mammoth pale, white, and nankeen. The texture of the cocoons was excellent, and we whould judge 1,200 to 1,300 would be sufficient to make a pound of raw silk, whereas it requires 3,000 cocoons of ordinary quality, to make a pound of raw silk. It should be remarked, that the cocoons had just been completed, and therefore the chrysalis was alive, and of course of full weight. G. B. S.

ON THE SELECTION OF MALE ANIMALS IN THE BREEDING OF CATTLE AND SHEEP.

(By the Right Honorable Earl Spencer.)

From the London Farmers' Magazine.

More from wishing to set an example to others, than from any hope that what I myself can suggest will be practically useful, I submit to the English Agricultural Society the results of my experience in an important part of that division of farming, to which my own attention has been particularly applied—I mean the breeding of stock. The part to which the following observations apply is the selection of male animals. A large proportion of farmers breed sheep, and several breed cattle; to all who breed either, this subject is one of great importance.

The object of a certain number is to breed bulls or rams for the purpose of selling or letting them, but that of the majority is to breed oxen or wethers

for the purpose of grazing. The first of these classes is very well aware of the importance of selecting good male animals, and profess to spare no trouble and to be very indifferent as to the expense which they incur in obtaining them; but with respect to those whose object it is only to breed oxen or wethers, I am afraid the case is generally very different, and they take very little trouble and expend as little money as possible in procuring the male animals to which they put their females; that is, they consider as a matter of indifference that on which the profitable or unprofitable nature of their occupation mainly depends.

It is admitted by every one that the bodily and constitutional qualities of the offspring are usually similar to those of the parents, either combining in various proportions the qualities of both parents, or taking entirely after one. I should say, as respects cattle and sheep, that, in most cases, the qualities of the male parent predominate in the offspring. I have also observed that the worse bred the female is, the more will this be the case when she is put to a well bred male. This observation was first made, I believe, by the late Mr. Berry, in an essay, for which he received a prize from the Highland Society. He accounted for it thus: a well bred animal means one whose ancestors for several generations have all been good, that is, have all possessed the peculiarities in constitution and shape which it is the object of experienced graziers to obtain in their stock. The characteristic, therefore, of the family of such an animal will be such peculiarities; but the ancestors of a badly bred animal will probably have varied in every possible way, and therefore there will be no distinguishing characteristic in its family; it is consequently most probable that the offspring produced from a cross between two animals so circumstanced will be more like the one in whose family there is a distinguishing characteristic, than the one in whose family no such characteristic exists. The common, but I believe, mistaken notion, that the offspring from the first cross is better than that from any subsequent one, probably arises from the improvement in the first instance being so much more apparent then, for the reason given above, it is likely to be in any generation afterwards. Now it is known to all graziers that the attempt to fatten an animal, who possesses no feeding propensities, produces loss instead of profit. If the above observations are correct, the feeding propensities descend from the sire; it is quite just, therefore, to say that a breeder of cattle or sheep, who considers it a matter of indifference what sort of male animal he uses, does consider it a matter of indifference whether he gains profit or incurs loss.

The first object which any breeder of cattle or sheep must keep in view, whether he intends to breed bulls or rams, or whether his aim is merely to breed oxen or wethers, is that the stock which he breeds shall be healthy. The first thing, therefore, to be considered in the selection of a male animal are the indications by which it may be possible to form a judgment as to his constitution. In all animals a wide chest indicates strength of constitution, and there can be no doubt that this is the point of shape to which it is most material for any breeder to look in the selection either of a bull or a ram. In order to ascertain that the chest of these animals is wide, it is not sufficient to observe that they have wide bosoms, but the width which is perceived by looking at them in the front should be continued along the brisket, which ought to show great fulness in the part which is just under the elbows; it is also necessary that they should be what is called thick through the heart. Another indication of a good constitution is, that a male animal should have a masculine appearance; with this view a certain degree of coarseness is by no means objectionable, but this coarseness should not be such as would be likely to show itself in a castrated animal, because it thus might happen that the oxen or wethers produced from such a sire would be coarse also, which in them would be a fault. Another point to be attended to, not merely as an indication of a good constitution, but as a merit in itself, is that an animal should exhibit great muscular power, or rather that his muscles should be large. This is an usual accompaniment of strength of constitution, but it also shows that there will be a good proportionate mixture of lean and fat in the meat produced from the animal: the muscles being that part which in meat is lean. A thick neck is in both bulls and rams a proof of the muscles being large, and there can hardly be a greater fault in the shape of a male animal, of either sort, than his having a thin neck. I am inclined to say, that in the new Leicester breed of sheep, which is the breed to which I am accustomed, a ram's neck cannot be too thick. Other indications of muscle are more difficult to observe in sheep than in cattle. In a bull there ought to be a full muscle on each side of the back bone; he ought also to have the muscles on the outside of the thigh full, and extending down nearly to the hough. It will seldom happen that a bull having these indications will be found deficient in muscle. With respect to rams, my own observation does not enable me to point out any other indications of muscle except the thickness of the neck, which I have mentioned above; if other farmers are able to point out any, I would only say there is scarcely any thing to which they ought to pay greater attention.

As I am writing for the use of farmers, it is quite unnecessary for me to attempt to give a description of what is considered a well shaped bull or ram; it is also obviously impossible to to express in words what is meant by good handling. It is sufficient to say, therefore, that no male animal is fit to be used at all as a sire whose handling is not good, and that the more perfect his shape is the better. The above observations apply to breeding generally; for whatever may be the sort or size of the animal intended to be produced, there is no doubt but that good health, propensity to fatten, and good shape, in all cases, ought to be aimed at. But there are not only different breeds, both of cattle and sheep, but experienced and very good farmers differ very much in opinion as to which peculiarities of shape and size are to be preferred, even among animals of the same breed. It is, therefore, very desirable before any man commences to breed either cattle or sheep, that he should make up his mind as to the shape and qualities he wishes to obtain, and steadily pursue this object; if he does so, there is very little doubt but that he will succeed in having a herd of cattle or sheep possessing the characteristics which he at first

intended they should possess; but if, on the other hand, he breeds at one time with the view of obtaining animals possessing one sort of shape, and at another time with the view of obtaining animals possessing a different sort of shape, the probability is, that his stock will possess neither the one nor the other in any degree of perfection. Having made this decision, he should take care that the individual male animal which he uses shall possess the qualities which he requires. In addition to this, it is of great importance that these qualities should have been characteristic of the family from which the animal is descended; and if he is old enough to have been the sire of any number of offspring, it is of a great deal more importance still that they should possess them. Because all the perfections of shape and quality which the best judge may wish to find in a male animal are, after all, only indications of what the stock got by him will probably be; the seeing therefore, what they really are is much more satisfactory.

There are few breeders of cattle more especially, who breed upon so large a scale as to enable them to keep many male animals at the same time in use. A man therefore, can usually look at the general qualities of the females which he posses, and observe what are the faults most prevalent among them; these he should be particularly careful to avoid in the male which he intends to use. It is sometimes said that the male animal ought to have no faults, and undoubtedly it would be very desirable that this should be the case; but unfortunately, no such animal exists. All a man can do, therefore, is to avoid putting a male and female together whose imperfections are the same, so as not to increase the fault already existing in the stock. If a man breeds upon a large scale, and uses several males at the same time, he can, of course, attend to this more effectually than if he uses only one. In this case, he should select and put together the males and females individually, so as to endeavor to correct any imperfections which either of them show. Most breeders of sheep, indeed, do use more than one ram, and all who pretend to take any praise in improving their flock divide their ewes, so as to put them with the ram who will most probably effect this object. I need not say that those (some of whom, I am sorry to say, still exist) who turn two or three rams of different shapes and qualities into a field with all their ewes, without attempting to make any selection among them, have no right to expect to be successful breeders; and if they do expect it, will certainly be disappointed. I believe the general opinion of breeders is, that it is advantageous to endeavor to correct any fault in the shape of a female by putting a male to her who possesses, in extraordinary perfection, the merit in which she is deficient, but who in some other part of his shape is faulty. My experience leads me to say that this mode of endeavoring to correct a fault is frequently successful. It would be better that none of the females from which a man intends to breed, should be faulty in shape to any considerable degree, but it almost always will happen that some animals, possessing an excellent constitution, good blood, and a great propensity to fatten, and therefore such as the owner would very unwillingly cull, will fail decidedly in some part of their shape. I would say that, when this is the case, it is worth while to try the experiment of putting to them a male remarkable for his perfection in this failing part; and, in my opinion, such a male will be more likely to correct the fault, than one who shows no one part of his shape very superior to the rest. The late Mr. Cline, whose eminence as surgeon is very well known, published a tract upon the breeding of domestic animals which contained, as might be expected, most valuable information. His suggestions are such as ought to be very carefully attended to; but it is probable that his meaning has been mistaken in one recommendation which he gives, namely, that in which he is understood to say that it is always desirable that the male should be smaller than the female. When he makes this observation, he is speaking of the crossing of different breeds, and probably only means that in a cross between a large breed and a small one, the male should be taken from the small breed, and the female from the large one. It is hardly possible that he intended to say that in the same breed the male ought to be smaller than the female, because this is contrary to the practice of nature. In every description of land animal with which I am acquainted, the males are of a larger size than the females. The attempt also to follow this advice would undoubtedly, in a few generations, so very much reduce the size both of males and females, as considerably to diminish their value. I can say, from my own experience, that some of the best shaped animals which I have bred have been produced by following a contrary course. I prefer breeding from large females; but if I do breed from one which I think too small I put her to the largest male of good shape that I possess. As one instance among several to prove that this course may be successful, the ox which I showed in the fourth class, at the last Smithfield show, and which obtained the prize in that class, was by the largest bull I have, from a cow so small, that I culled her after she had bred that one calf. It must be admitted that the theoretical reasoning which Mr. Cline adduces in support of this recommendation appears to be very conclusive; but, even in the restricted sense in which I understand it, there is some doubt whether it is practically correct. The most successful cross between two different breeds of cattle, of which I am aware, was the one between a Durham bull and a Galloway Scotch cow, made by Mr. Charles Colling. The produce from this cross sold for enormous prices at his sale, and at the present day a majority of the best short-horned cattle are descended from it. My opinion, then, the result of my own practical experience is, that if a man considers the female animals which he possesses to be smaller than he wishes, he may safely put them to a male of large size, provided he is well bred, of good quality, and is well shaped. But I am bound to add, that I know, in giving this opinion, I differ from the most skilful and successful breeders with whom I am acquainted.

It follows from the above observations, if they are correct, that the first and most indispensable object which all breeders must try to obtain, whatever may be the shape or size they prefer, that the male animal which they select shall possess a strong and healthy constitution. This is absolutely essential; but it is also most conducive to their success that they shall, after due consideration, make up their minds as to the qualities which they wish their stock to possess: that, having made

this decision, they shall steadily pursue the object they have in view, and endeavor to select such males as shall be likely to get offspring possessing these qualities; that they shall carefully and candidly examine the females from which they intend to breed, observe the faults, in shape or quality, which prevail among them, and select males who shall possess corresponding perfections. That the safest mode of ascertaining what are likely to be the qualities of the produce from a male in future is, where there is the opportunity, to see what are the qualities of the offspring already produced from them; then, the next to this if, to observe what are the qualities of the family to which he belongs; and that in the case of not having the opportunity of making use of either of these guides, they may assume that it is probable that the qualities of the individual himself, which in all cases ought to be attended to, will, if he is well bred, descend to his offspring.

It has already been said that their are two classes among the farmers who breed cattle and sheep; the one, of those who breed bulls or rams, and the other, of those who breed oxen or wethers for the purpose of grazing only; the above observations are intended to apply to both. But much more attention ought to be paid for the first of these classes in the selection of the animals from which they breed than is absolutely necessary in the other. This is essential to their own interest, because a male animal very often shows faults in his shape which, if he had been castrated, would not have appeared. It frequently, therefore, happens that the produce from a bull or a ram may prove excellent cattle or sheep for grazing purposes only, but may be totally unfit to be kept as the sire of future stock. Their duty also to those who hire or buy from them imposes upon them the obligation to pay the strictest and most minute attention to the qualities of their male animals; more particularly, they are bound not to offer to their customers any one, of the health of which they have any reason whatever to doubt, whether this doubt arises from any weakness of constitution, which may have appeared in the individual himself, or whether it arises from their knowledge of the family from which he is descended. They are bound also, not to keep as males any animals who are not perfectly well bred. It does not follow from this, that a long pedigree is in all cases necessary, although it is generally desirable; but it sometimes happens that a female, of whose pedigree the owner is ignorant, will have produced offspring which have all possessed extraordinary merit, and which have proved themselves good breeders also: a male descended from such a female may be considered perfectly well bred on her side; and will, very possibly, prove a better sire than many whose pedigree is much longer.

In paying this minute attention to their occupation, the breeders of male animals have some advantages not possessed by others; they have generally the opportunity of knowing accurately what are the characteristics of the families of the animals from which they breed, an opportunity not possessed by those who breed only for grazing purposes. In order to make a proper use of this advantage, they ought to keep accurate pedigrees of their cattle and of their sheep, and as far as possible, when they put the males and females together, recollect what have been the respective qualities of the ancestors of each. They have also the opportunity, by using a male cautiously at an early age, of knowing by experiment, whether the stock produced from him is good or bad, before they run the risk of injuring their stock materially by using him largely. This may be ascertained with sufficient accuracy when the produce are very young; for an experienced breeder can judge with tolerable certainty what will be the shape of a calf or a lamb when it grows up by seeing it soon after it is born, and before it has begun to lay on fat. Nor is it necessary to see many of the produce for the purpose of deciding what its general characteristics will probably be. I admit that in saying this I am speaking more from my experience as a breeder of cattle than a breeder of sheep, but I believe the same observation will apply to both. It is certain, however, that seeing four or five calves from a bull ought to be a sufficient guide to the breeder as to whether he will be valuable as a sire or not. Unless there is a family likeness which generally pervades through the produce from a bull, although he may be valuable as the sire of oxen, it will not be safe to use him as the sire of bulls. The seeing, therefore, four or five calves will prove to the breeder whether there is such a family likeness among them, and whether it exhibits itself in such qualities as indicate that when they grow up they will be valuable animals.

There is one failing to which all breeders are liable, but to which the breeder of male animals, from the greater interest attached to his occupation is more peculiarly liable, and against which he ought most carefully to guard himself; this is, too great a partiality for animals bred by himself. In order to guard against this he ought to occupy himself more in looking for faults than in discovering merits in his stock, he ought to listen to every criticism he hears made upon them, even by those whose judgment he does not hold in high estimation—not, of course, with the view of being satisfied at once that the criticism is correct, but with the view of satisfying himself, by accurate and candid examination, whether it is so or not; and he ought froquently to see the stock belonging to other breeders, and fairly compare its merits with those of his own.

I think it most probable that in the foregoing observations nothing will be found which will give new and useful information to practical farmers; but I have been induced to submit them to the English Agricultural Society, because I conceive that one of the great objects of that society is the diffusion of knowledge connected with every branch of farming. The best way in which it can be enabled to effect this object, is by those of its members who have paid attention to any of the divisions of farming operations, communicating to the society the results of their practice and experience. It will then be for the society to circulate, by any means in their power, such of these communications as it shall appear to them are likely to be useful to those engaged in the cultivation of the land. With this view I place this paper at their disposal.

CHINCH BUGS.

From the Raleigh Star.

These mischievous little insects have, we regret to learn, committed great ravages upon the wheat

crops in the adjoining counties of Chatham, Orange, Granville and Franklin. In some instances, whole fields have been entirely destroyed, and great fears are entertained that they will next attack the corn,* to which they also are very destructive. The cluster around the stalk in incredible numbers, suck out its substance, and it soon withers and falls to the ground. In some places, to prevent their reaching the corn, for which they are marching in clouds, the farmers dig little ditches and fill them with straw, in which the bugs make a temporary halt, and are burnt—the operation of burning being frequently repeated, during the day. Although the bugs have wings, they travel on the ground. They are natives of the forest; and it is said that where the woods are occasionally burnt, they never become troublesome.

SPAYING HEIFERS.

Gloucester County, Virginia,
February 13th, 1821.

From the American Farmer.

Mr. Skinner.—A friend of mine, observed to me a short time since, that you had requested information on the subject of spaying heifers, and though a subscriber to your useful publication, the American Farmer, I have overlooked it. I will however, give you some account of my experience. Ten or twelve years ago, I began with two in the spring, when they were two years old, and succeeding, I have not failed to spay from two to three each spring since—so that the whole number amounts to between twenty and thirty, and have lost two only by the operation. My most sanguine expectations have been exceeded in the superior excellence of the beef, which is peculiarly delicate. I have had them slaughtered from five to six years of age, and believe they would be larger, and probably better a year or two older; they are thrifty and fattened with facility; the size in much increased by the operation, which is performed in the same manner that sows are treated for the same purpose, but I believe it might be improved (and I mean to try) by forming an inclined plane of soft earth, nearly to an angle of forty-five degrees, against a post for securing the hind legs when the animal is laid on her back, with the heels up, and the head confined below; for the pain must be excessive when suspended by the hams sustaining its whole weight. I have no doubt but the bowels in that situation will be sufficiently out of the operator's way. Two years since, I caused two young cows with their first calves, a month old, to be spayed—they were about two years and nine months old, having, by accident had access to the bull, about the age of two years—my object was to ascertain whether they would continue to give milk as long as they ought to live, agreeable to report: They do continue to give milk, but not equal to what I expected—I am inclined to believe these cows were too young, their udders not sufficiently formed, & which had not grown with their growth—our milkers too, are black women who perform that business carelessly. In my long life, being more than seventy years old, I never new but one free martin, (a barren heifer, that has been a twin with a bull calf) raised in our country—that with its male twin, a cow of mine produced, four years ago. They are well grown, handsome, and so much alike, they are not readily distinguished from each other; they have been recently subjected to the yoke—the martin has not a feminine appearance, and is at least, equal in strength and agility to its twin brother. I have no doubt it will perform well, as would also the spayed heifer, if required for some years, and then make the most valuable beef. The martin has had free access to the bull for nearly twelve months—he has never, to the knowledge of any one, noticed her, and her appearance would justify the belief, and also the report that they will not breed. I am,

respectfully your's,
PHILIP TABB.

* This they have already done to a considerable extent, it is said, in Mecklenburg and Anson counties.

SILK-CULTURE IN TURKEY.

Miss Pardoe, in a late work, has the following notice of the manufacture of silk, and the culture of the mulberry tree in Turkey:

"Our next job of inquiry was the mode of feeding the silk worms, which produce, in the neighborhood of Broussa, an extraordinary quantity of silk. We accordingly visited the estsblishment of a Frenchman, who exports the raw material to Europe. I was struck by the color of the silk, which was of a dingy white; and learned that, despite all the efforts of the feeders, they seldom succeed in producing any other tint, although the worms are themselves of different qualities and colors, varying from a dead white to a dark brown, and are fed with the leaves of both the red and the white mulberry indiscriminately. The most experienced feeders, however, give a decided preference to the wild white mulberry, of which most of the plantations about Broussa are formed. The silk, when first spun, is of a clear, silvery, brilliant tint; but submersion in the highly mineralized water of the neighborhood, robs it of its lustre, and reduces it to the dead, dingy color I have mentioned; and I was assured, that in some hundreds of pounds weight of silk, not more than two or three could be met with of yellow.

The Asiatic method of rearing the worm is totally different from that of Europe, and according to the account given to me, much more profitable in its results, as well as simple in its process. The insect has a natural dislike to being handled, which is inevitable where it is fed day by day, and the withered leaves of the previous day cleared away; the discomfort produced by the touch rendering the worm lethargic and retarding it growth. The Asiatics never approach it with the hand; when it is hatched, the floor of the apartment is covered with layers of the mulberry branches to about three or four inches in depth; and upon these the insects are laid, and suffered to feed undisturbed until their first sleep, when they are covered by a fresh supply of boughs similar to the first, through which they eat their way, and upon which they subsist until their next change.

This operation is repeated four times, always at the period when the worm casts its skin; and

and on the first appearance of an inclination to spin, boughs of oak, of about four feet in length, stripped of their lower leaves, and planted, if I may so express it, in close ranks in the bed of mulberry branches, from a pigmy forest, in which the insects establish themselves, and wherein they produce their silk. Every crevice of the apartment is carefully stopped to prevent the admission of air, and a fire of charcoal ashes is kept up constantly throughout the day and night.

Whether the mode of feeding operates on the color of the silk, I could not ascertain, though it struck me that the experiment would be worth trying; but meanwhile it appears to be certain that it greatly increases its quantity, and diminishes the labor of feeders. There is scarcely a house in the neighborhood of Broussa, which does not contain several apartments filled with silk worms, whose produce is disposed of to the spinners, of whom there are a considerable number in the city; and the far spreading mulberry woods asume in the height of summer the appearance of stretches of locust-blighted landscape, every tree being left a branchless trunk, without a sign of foliage."

THE EDITOR TO HIS READERS.

The editor of the Farmers' Register is induced again, (and still fruitlessly he fears,) to complain of the general silence of most of those correspondents and contributors who have heretofore given to this journal its greatest value—of the *total* silence, and denial of such aid, by hundreds of other subscribers and readers who could render as good service—and of the almost universal and still growing apathy and carelessness of the southern agricultural community in regard to writing for the public—the only means of sustaining the diffusion of agricultural information—indeed the only means existing of furthering agricultural improvement, and sustaining agricultural interests. With such aid as the present subscribers to this publication can well furnish in writing, there is no question but its original matter, its store, and regular supply especially, of agricultural facts and useful practical information, would make it as efficient for agricultural improvement as its best friends could hope for, or as the most captious critics and fault-finders would insist npon. With but a small proportion of such aid, compared to what the list of subscribers might have furnished, there has been elicited, and made known through the pages of this work, a mass of varied and important information, which has already proved of incalculable value to agriculture. But many of the most valuable contributors have been removed by death—and most of the others have ceased to furnish the aid by which they formerly sustained, through this publication, the great cause of the improvement of southern agriculture; and the few new contributors, though the more welcome and prized because of the rareness of present assistance, do not, by their number, fill the space left void by their predecessors. If a judgment is to be drawn from the continuance of the names of former contributors on the subscription list—from the general support given and continued by subscriptions—and by the absence, or at least paucity, of complaints of want of interest and value in the work—there would be no reason to infer that the Farmer's Register has lost any thing of its claims to, or its hold upon, public favor and support. But, though such complaints have not yet been made, by his readers, so far as he knows, the editor does not hesitate to call attention to this great and deplorable deficiency in the sources of the greatest, if not the sole value of an agricultural magazine. It is not in accordance with the *maxims of the trade* that the proprietor of a publication should be the first to proclaim a falling off in the interest and value of its contents; still the proprietor of this, does not hesitate to do so, even at the risk of the declation affecting the pecuniary and business value of the publication, as much as the deficiency complained of does in regard to its reading and instructing value. He repeats, what has been so often before stated and urged, that it is principally the writings of others, and especially the facts presented by practical cultivators of the soil, that have given value to this work; and that without such aid, and liberally bestowed, neither this nor any other agricultural journal can be long sustained, or deserve to be sustained.

And why should this deficiency of communications exist? Every former contributor since his long passed last communication surely has learned some new facts, or by trial settled some disputed points, the communication of which would be interesting and useful to the agricultural community. Hundreds of individuals on the list of subscribers could be designated, and who prize the work, and heartily wish well to its success, of whom there is not one who could not add to the value of its contents, not only from his stores of previously acquired knowledge, but from the new agricultural facts and opinions learned in almost every month of his continued operations. It is idle and ridiculous to allege that there is any want of materials, and good materials, for regular, continued and increasing communication and discussion, and valuable instruction on agricultural subjects. The field cannot possibly be exhausted—and the more it is cultivated and gathered from, still the more will be offered for new labors, and new gains. As well might it be said that religious *(so called)* periodicals must fail, because all subjects of controversy were exhausted—or that political and partizan papers must want matter for publication, because the dirty game of party had been played

out, and no subjects left either for slander and defamation, or fulsome and degrading adulation, and mercenary servility. No one thinks for a moment that the materials for, or the interest in, the exciting and popular subjects of sectarian controversy, or political warfare, can possibly be diminished—and on one or both of these subjects all read, who read any thing. But on agriculture, by which all live, in the improvement of which all are interested, (and the practical operations of which are perhaps the sole profitable occupation of most of the persons who sustain such obfuscating publications as are above referred to,) commands no abiding interest, and the subject is supposed to be soon exhausted. It never can be exhausted; and it is one on which so much light is needed, and so much can be furnished, that the more it is treated of, the more of new matter will be presented for consideration and profitable instruction.

The editor has devoted his labor and his time for nearly seven years to the support of this work and its great objects, to the exclusion and necessary neglect of other things in which his private gain was more deeply concerned, and by attending to which, his interest would have been better served. He has recently abandoned all personal and direct participation in other business, and will continue to devote his energies exclusively to sustaining this publication, heavy as the burden has been and will be, when so little aided by the labors and the encouragement of others. Therefore, should the public support be eventually withdrawn, and the work sink for want of pecuniary as well as literary support, that result would prove a most serious blow to the private interest now so entirely vested in the property. Nevertheless, the consideration of this contingency, which may be hastened and made more sure by predicting its possible occurrence, shall not prevent it being stated in the strongest manner to those who sustain this work by their subscription money, that they must also give it the better aid of their pens, and maintain the interest thus to be produced, or that the publication must become of comparatively little worth, and sink.

During the last six or eight months the Farmers' Register has been very copious, and the contents very interesting and instructive, upon one subject of all-absorbing recent interest in this country —that of silk and mulberry culture. So large a proportion, indeed, of its pages has been devoted to this subject, that, as the editor was sensible, it was out of all proportion to the remaining and more important subjects of agriculture in general. But whose fault was this, but of the individuals who could, and ought to have written on other subjects, and who did not? Communications on cropping, on grass, on cattle, on the improvement of soil, would have been far more prized, if only for their rarity; but very few such have been furnished recently by correspondents; and if the Farmers' Register had not been so much devoted to furthering silk-culture latterly, it could have offered but few original pieces of value on other subjects. It is admitted that the editor's investigations and writings have been principally devoted during this time to silk-culture; and if it is in him an error to enter zealousy and heartily in support of every subject which he deems of great interest, it is one which he will always be disposed to fall into. He tried at various times during the last six years to impress upon his readers the importance of silk-culture to Virginia; but until recently there were no materials to operate upon, and his words were unheeded, if not unnoticed. But the iron, which he before struck upon cold and unyielding, *is now at a red heat*, and he has deemed it proper to strike continually while the blows may possibly be effective. He trusts that his and other perhaps more efficient efforts in this cause, have already done much good, and that there is now no doubt of silk-culture being established in this country, and particularly in Virginia, speedily, permanently, and profitably. That alone will be a result of more utility and value to the public than a thousand-fold the cost of this publication. But still the editor has no intention or wish that the publication should be principally devoted to silk-culture, or to any one of the many important branches of agriculture in general; nor can any one justly complain of the preponderance of articles, recently, on silk-culture, unless communications on other subjects had been offered, and received with a less degree of welcome and attention—which certainly has not been the case.

PROMISCUOUS.

For the Farmers' Register.

I make it a rule never to be idle, and whereas I am at this time very nearly in that situation, I write for the Register; and if this shall answer any good purpose, I may at odd times continue the practice. I dislike any thing superfluous, therefore request, that you now take your pencil in hand, and erase any letter, word, or sentence, of such description, lest when I come to read, I may be tormented with my own work, as often as I have been with that of others.

Suckers on Indian corn.—Lands which are rich to a great depth, if not planted thick, will sucker profusely; and in such case the suckers will not damage, but be serviceable, by extracting the repletion, which would otherwise create disease. But if such grounds be planted thick, either in drills, in clusters, no suckers will appear, especially on a deep fallow. So likewise will corn suck-

er profusely, on a shallow fallow, where the surface is rich, and the under stratum poor; but in this case the suckers will presently be a nuisance, for the soil will not continue sufficient to feed both plants and suckers. If such ground be fallowed deep, no sucker will appear, although thinly planted.

Lodged grain.—No grain will lodge whilst healthy. Diseased seed, diseased ground, diseased atmosphere, insects and dung, will make grain unhealthy. Both very thick, aad very thin growing, grain will stand erect: in the first case, any disease being equally divided amongst the numerous plants, the effect is slight; in the second, the air and sun can penetrate in such abundance, that any poisonous matter is extracted or evaporated. If on land already in good heart, a goodly portion of fermented manure be turned in to the depth of a three or four-horse fallow, we might expect a healthy and abundant crop of wheat; and I know of no reason why the produce in Virginia would not, could not, be equal to that of France, or elsewhere. I believe it to be useful to spread manure on the surface of a shallow fallow and thin soil. Every person of observation will remember that on ordinary and shallow tilled grounds, wheat and other crops start vigorously, and stole profusely; but when the surface has become somewhat exexhausted, and nature has pushed the roots downward, there is a sudden failure, the greater portion of those stoles will perish, and consequently disease is generated.

I have now standing 60 heads of wheat, containing about 2000 grains, which are the produce of one grain; this I intend to sow on ground prepared according to the above ideas; and if the produce hereafter should be one-twentieth part of the present, that would be one-hundred fold; and why not?

Grasses.—I send the heads of a grass which I call the *smooth cock's-foot;* and another which I suppose to be the American *rye-grass*—please let me know what they are?

Sour grasses, and sour weeds, are more numerous this year than I have ever known them—sumach, fern, cheat or chess, sorrels, &c. &c.

Hay.—I never have food sufficient to winter the cattle, which I graze through summer. I have a bank about one mile long, which is clothed with shrubbery, consisting of poplars, ash, mulberry, linn, sassafras, locust, walnut, &c., of which I have strong mind to make hay. My ideas is to break off the tips of the limbs by hand, and cure and stack as usual for grass; but if you Mr. Editor, or any other person, would suggest a cheaper or better plan, I would thank you.

Prices current.—If the editor would state the prices of beef, cows, &c. &c., he would much oblige some of his western subscribers.

Writing.—Many persons do not promulgate information which would prove valuable, because they have no time; many will not write because they fear criticism, and some fear contradiction. Now, I have at all times, about as little time to write as the next man; as to criticism, it would be sport for me; and as to contradiction, nothing could better please me; because to prove either truth or falsehood, something valuable is apt to be elicited. But I am sorry to believe there are some amongst us who have other, and worse reason for not attempting to enlighten the community, to wit, a desire to be the big man—not the desire to be the greatest amongst the great, but that selfish and mean disposition to keep others in obscurity and ignorance, that he, who is little, may appear big. He who lives alone for his own good, is a brute; and like a brute, will he go down to the grave, to be thought of no more.

Seeds.—I think it a shame for old Virginia to send to the Yankees for their garden seeds. Our mountains are equal to any place in the world, for the production of large and healthy vegetables; and if I thought I could profit, I would try a seed garden.

Improvement of land.—I have made thorough trials of improvement by turning under sorry and ordinary crops of oats, and can recommend it as a cheap and expeditious method. Turn them in when merely half ripe, by which means sudden putrefaction is secured; which putrefaction will be food for the second crop of oats.

In closing, I will remark that I am a subscriber to your paper, that I was raised to farming, that I have read nearly every publication on farming, that my locks are getting gray, and yet I am lacking—lacking—lacking.

Although I am neither ashamed of my name, nor writing, yet request you will not mention my address.

As evidence of my sincerity in asking questions, I pay postage. MOUNTAINEER.

[We are pleased to have the observant, practical, and *working* farmer, that we believe the writer above to be, in our pages, even without a name. He will be always and still more welcome, and still more useful, over his own real signature. We have neither erased nor altered, nor supplied a word.

From our correspondent's proposal to cure leaves for winter forage, it is presumed that he has read and profited by Professor Symonds' account of the practice in Italy, in one of our recent numbers. If not, it is recommended to his notice. Let him, by all means try the experiment, and report the result to the Farmers' Register.

We would, with pleasure, extend the prices current on the covers of the monthly numbers, not only to beef, live-stock. &c., but to many other articles of agricultural products; but the demand of the small town in which we publish, is too limited to show market prices—and to endeavor to obtain them from abroad might lead to deception, more frequently than furnish correct information.

The heads of grasses, in the state received, could not be identified. One seems to be the "feather-grass," of which we know not the botanical name, nor the grade of comparative value.—ED. F. R.]

THE CHINCH BUG IN SURRY.

For the Farmers' Register.

Surry county, July 1*st*, 1839.

Perhaps it may not be uninteresting to some of your readers, to learn the sad, and lamentable news, that the chinch-bug is now spreading rapid-

ly over every part of our county, and on some few farms destroying every thing before it, and I am afraid, it is destined at no very distant time, to be one of the greatest calamities that ever befel this country. Many farmers (and indeed very reasonably so,) are very much alarmed at the visitation of this great destroyer, not only of the farmer's hopes, but in fact of man's principal and main support of existence. We are now harvesting our wheat crop, in which they got rather too late to destroy it entirely, but on many farms have seriously injured it, many places in the fields being quite destroyed. On following after the scythes, you may see millions of the bugs, of all sizes and colors, red, black and gray, running in the greatest consternation in every possible direction, seeking shelter under the sheaves of wheat, and bunches of grass, which may happen to be near. But all those on the borders of the field, and indeed on every part of it, very soon quit the dry and hard stubble for the more tender and juicy corn or oats, whichsoever may be nearest at hand; and now commences their havoc and dreadful devastation. We see the healthy, dark-green, luxuriant oat, which a few days before looked so beautiful and rich, turn pale, wither and die, almost at their very touch. It would seem exaggeration and almost incredible to state how very prolific this devouring insect is, their increase being so prodigiously great, as to appear to be the work of magic.

In one day and night they have been known to advance fifteen or twenty yards deep in a field, destroying as they proceed. Unless some kind dispensation of providence delivers us from this ruthless enemy to the farming interest, it is impossible to say to what extent their ravages will, and may extend, in the course of a year or two. To us farmers, who are dependent on the productions of the earth, for our every thing, it is truly awful. And if their increase in future is commensurate with the past, it must be but a short time before this section of country will be laid waste by this dreadful depredator, and its inhabitants, reduced to want and misery. Every attempt hitherto made to arrest their progress, or destroy them, has proved abortive. Some have attempted to drive them from their corn by pouring boiling water over them; a remedy, for the corn, as bad as the disease. Others try to stop their ingress to the corn fields by digging ditches around the fields; but with no avail, as they are furnished with wings, in a short time after they are hatched, and of course can easily fly over the ditches. Would it not be advisable always to sow clover, or some other tender grass, with all small grain, to induce the bug to remain in the field after the grain is taken away long enough, to enable the corn crop to get size and age, so as not to be seriously injured by them. I have observed that the older the plant, the much less liable it is to be either injured or attacked. The wheat crop, where it is not injured by the bug, is as promising, and bids fair to yield as plentiful a harvest, as I have ever seen. In fact, this crop is gradually increasing, more having been sown last fall, than for several years past; this desirable change, may perhaps be attributed partly to the use of marl. The growth of the corn crop is very fine; oats likewise; cotton but little, and that very indifferent.

AN OLD SUBSCRIBER.

COMPARITIVE VALUE OF MORUS MULTICAULIS, MORUS ALBA, AND THE CANTON, ALPINE, FLORENTINE AND CHINESE SEEDLING MULBERRY TREES.

For the Farmers' Register.

To the citizens of Virginia, who design making permanent plantations of the mulberry, for the purpose of embarking in the culture of silk, the adoption in the beginning, of such varieties of the mulberry as are best suited to our soils and climate, is of the highest importance. Enjoying as I do at present the opportunity of comparing the above-named varieties, so as to form a tolerably correct judgment, as to their value for the prosecution of silk-culture *in Virginia*, I will, endeavor to state, with plainness, brevity and candor, the conclusions to which I have been led by a careful examination.

Of all the above-named varieties the "morus multicaulis," justly claims the pre-eminence. Its growth is rapid, and as large as it should be for a *permanent* plantation, on light sandy soils that are capable of producing 15 or 20 bushels of corn to the acre. Indeed, it should not be planted on more fertile soils, because at the age of four or five years, after having been headed down, the stalks are liable to be broken down by violent winds. On this point, I speak from very recent experience. It is capable of enduring our hardest winters. In proof of this, the following facts are stated: In the fall of '37 and '38, I dropped in the field a small tree of "morus multicaulis," which remained exposed *root* and *branch* all the winter. It was found, and planted in March, following, and is now healthy, and growing very rapidly. In '38 and '39 other plants were exposed in the same way, which are yet living and doing very well. From those facts some may imagine that the winters in this part of Virginia are very mild; but it is far otherwise. In this region the sassafras and wild pimento, *(laurus benzoin,)* both of which are found in high northern latitudes, have occasionally been killed, and the ground freezes to the depth of fifteen inches. This occurred in the winter of '36 and '37 when we had standing out 900 small plants of "multicaulis" raised from cuttings planted the preceding May, and not more than three or four were lost. I thawed the ground by building a fire, in order that I might get accurate information.

The "morus multicaulis" makes silk of the finest quality, equal, if not superior to the silk from morus alba, and much softer and more lustrous than that produced from morus rubra. I have made very careful experiments on this point, and I confidently assert that the published statement of some northern men, that the silk of "morus multicaulis" is as coarse as that from "morus rubra," or "morus nigra," is without foundation in fact, and evinces either ignorance or want of candor.

Next to the "morus multicaulis," I place a mulberry which I shall call the "Chinese seedling." This is a scarce plant, and cannot for several years at least, come into competition, for purposes of speculation, with the other varieties. I therefore hope I shall escape the suspicion of a *tree selling* communication. It was raised by Mr. C. H. Hunt, of Fredericksburg, from seed which were purchased for multicaulis seed. I have this var-

ety, the "Canton" and the "Alpine," growing from cuttings on similar soil, and I have no hesitation to affirm that it is superior to either. It furnishes leaves that are as large, and they are heavier, more thickly set on the branches, and more glossy. Next to the "Chinese seedling," for light sandy soils, I place the Canton. It bears leaves about half the size of "morus multicaulis," grows very well in such soils, and propagates readily from cuttings.

With respect to the value of morus alba, and the Alpine and Florentine, which are both varieties of the former, I have to say that they will prove valuable to farmers having land that will produce from 80 to 100 bushels of corn to the acre; but on inferior soils they are not worth the expense of cultivation.

I will only add that I consider the Florentine superior to the Alpine.

LAYTON Y. ATKINS.

Stafford co., Va., July 1839.

UNIVERSITY OF VIRGINIA.

List of Graduates of July 4th 1839.

ANCIENT LANGUAGES.

John W. Clay, Huntsville, Ala.
Robert A. Coghill, Amherst, Va.
Muscoe R. H. Garnett, Essex, Va.
Wm. H. Glascock, Huntsville, Ala.
Hunter H. Marshall, Charlotte, Va.
Joseph A. Shanklin, S. Carolina.
James A. Waddell, Staunton, Va.

Latin Language and Literature.

Charles H. Barksdale, Charlotte, Va.
John Staige Davis, University of Va.
Richard Barnes Gooch, Richmond.
Marcellus V. Lanier, Danville,
Carter P. Johnson, Richmond City,
F. R. Rives, Albemarle Co.
John S. Smith, Louisa,
J. D. Thornton, Cumberland,
Thomas H. Watts, Alabama.

MODERN LANGUAGES.

French Language and Literature.

Charles H. Barksdale, Charlotte, Va.
Benj. J. Barbour, Orange, "
Wm. S. Caldwell, New Orleans.
John Staige Davis, University of Va.
Richard B. Gooch, Richmond City.
Muscoe R. H. Garnett, Essex, Va.
William H. Glascock, Huntsville, Ala.
Geo. F. Harrison, Cumberland, Va.
Carter P. Johnson, Richmond City.
Aaron Jeffery, Norfolk Borough.
John C. Meredith, Louisa, Va.
James Morris, Louisa, "
Francis E. Morancy, Louisiana.
Peter B. Prentis, Nansemond, Va.
Wm. L. Pitts, New Orleans.
George F. Pitts, Kentucky.
Francis R. Rives, Albemarle, Va.
John Prosser Tabb, Gloucester, "
Isaac R. Watkins, Charlotte, "
Charles D. Wharton, Goochland, Va.
J. A. Washington, Mount Vernon.

Spanish Language and Literature.

John W. Clay, Huntsville, Ala.
John Staige Davis, University of Va.
Richard B. Gooch, Richmond City.
Wm. H. Glascock, Huntsville, Ala.
George F. Harrison, Cumberland, Va.
Carter P. Johnson, Richmond City.
James Morris, Louisa, Va.
John C. Meredith, do "
Hunter H. Marshall, Charlotte, Va.
Francis R. Rives, Albemarle. "
C. R. G. Slaughter, Charlottesville.
Isaac R. Watkins, Charlotte, Va.
Charles D. Wharton, Goochland, "

German Language and Literature.

George W. Blættermann, U. of Va.
Muscoe R. H. Garnett, Essex, "
Samuel Saunders, Lunenburg, "

MATHEMATICS.

Pure.

John B. Baldwin, Staunton, Va.
Charles H. Barksdale, Charlotte, Va.
John S. Caskie, Richmond City, "
Henry Coalter Cabell, do do.
John Staige Davis, University of Va.
Muscoe R. H. Garnett, Essex, Va.
Wm. L. Harris, Tennessee.
Wm. L. Jones, Mecklenburg, Va.
Carter P. Johnson, Richmond City.
Wm. W. Roper do do.
Geo. W. Randolph, Albemarle, Va.
Chapman Johnson Stuart, Richmond City.
C. R. G. Slaughter, Charlottesville.
Isaac R. Watkins, Charlotte, Va.

Mixed Mathematics.

R. W. Bushnell, Rockingham, Va.

NATURAL PHILOSOPHY.

John B. Baldwin, Staunton, Va.
John L. Burruss, Louisa, "
Robert L. Brown, Nelson "
John Critcher, Jr., Westmoreland.
Lewis W. Cabell, Buckingham, Va.
Willis J. Dance, Powhatan, Va.
William L. Early, Madson, "
Wm. H. Jones, Mecklenburg, "
James Alfred Jones, "
John S. Minor, Albemarle, Va.
James Morris, Louisa, "
Geo. W. Randolph, Albemarle,
C. R. G. Slaughter, Charlottesville.
Samuel Saunders, Lunenburg, Va.
James A. Waddell, Staunton, "
Thomas H. Watts, Alabama.

CIVIL ENGINEERING.

Wm. L. Harris, Tennessee.
John W. Lambeth, Lynchburg, Va.
Nath'l C. Manson, Lynchburg, "
Samuel Saunders, Lunenburg, "

CHEMISTRY.

J. A. J. Bishop, Charlottesville.
John L. Burruss, Louisa, Va.
Richard W. Bushnell, Rockingham.
Jenjamin J. Barbour, Orange, Va.

Lewis W. Cabell, Buckingham, Va.
Eugene Davis, University of Va.
Donald M. Harrison, Amelia, Va.
Wm. H. I'Anson, Petersburg, "
Wm. Sizer, King William, "
Chapman J. Stuart, Richmond City.
Wm. M. Swoope, Augusta, Va,
Lewis Turner, Louisa, "

GRADUATES IN MEDICINE.

With the title of 'Doctor of Medicine.'

Robert M. Anderson, Dinwiddie, Va.
John H. Bell, Rockbridge, "
J. A. J. Bishop, Charlottesville, "
Wm. S. R. Brockenbrough, Hanover.
Charles Carter, "
Levin S. Joynes, Accomack, Va.
Wm. Q. Johnson, Louisa, "
James H Minor, Albemarle, "
George W. Morris, New Kent Va.
Wm. H. Phillips, Albemarle, "
William P. Read, Amherst "
R. A. Scruggs, Buckingham, "
Wm. M. Swoope, Augusta, "
Thos. Woodley, Isle of White "
Austin H. Wright, Richmond City.
F. D. Wheelwright, Westmoreland,
Price M. Watson, Albemarle, Va.

MORAL PHILOSOPHY.

Benjamin J. Barbour, Orange, Va.
Wm. P. Bayly, Accomack, "
R. W. Bushnell Rockingham, "
Henry C. Cabell, Richmond City, Va.
Willis J. Dance, Powhatan, "
Eugene Davis, University of Va.
W. P. Duvall, Tallahassee, Florida,
Richard B. Gooch, Richmond City.
Donald M. Harrison, Amelia, Va.
James P. Holcombe, Lynchburg, Va.
James Alfred Jones, Mecklenburg.
Augustus E. Maxwell, Alabama.
Francis E. Morancy, Louisiana.
Wm. L. Pitts, New Orleans,
Robert R. Prentis, Nansemond, Va.
Samuel Saunders, Lunenburg, "
James R. Sneed, Georgia.
John R. Stapler, "
Lewis Turner, Louisa, Va.
J. A. Washington, Mount Vernon,
Chas. D. Wharton, Goochland, Va.
L. W. T. Wickham, Richmond City.

LAW.

Peter Carr, Albemarle, Va.
C. C. Clay, Jr., Huntsville, Ala.
Thomas O. Dabney, King William.
Robert A. Johnson, Lexington, Ky.
Robert Patterson, Philadelphia.
Henry Spencer, Charlotte, Va.
Robert H. Whitfield, Isle of Wight.

PROFICIENTS IN MEDICAL JURISPRUDENCE.

John B. Baldwin, Staunton, Va.
John G. Cabell, Richmond "
Wm. L. Early, Madison, "
Mathew M. Harrison, Brunswick.
Wm. H. I'Anson, Petersburg, Va,
John R. Stapler, Georgia.
Thomas L. Walker, Albemarle, Va.

PROFICIENTS IN POLITICAL ECONOMY.

Wm. P. Bayly, Accomack, Va.
Richard W. Bushnell, Rockingham.
John D. Bracey, Alabama.
Henry C. Cabell, Richmond City.
Willis J. Dance, Powhatan, Va.
W. P. Duval, Tallahassee, Florida.
James Alfred Jones, Mecklenburg.
Thomas B. Jordan, Georgia.
James Morris, Louisa, Va.
James R. Sneed, Geergia.
J. A. Washington, Mount Vernon.
Thomas H. Watts, Alabama.
L. W. T. Wickham, Richm'd City.

The following students having graduated in the schools of Ancient Languages, Modern Languages, Mathemaics, Natural Philosophy, Chemistry and Moral Philosophy, were declared

"MASTERS OF ARTS OF THE UNIVERSITY OF VIRGINIA."

R. W. Bushnell, Rockingham Va.
Eugene Davis, University of Va.
Donald M. Harrison, Amelia, Va.
James Alfred Jones, Mecklenburg,
Samuel Saunders, Lunenburg, Va.
Charles D. Wharton, Goochland, Va.

WILLIAM AND MARY COLLEGE.

Public exercises and honors of July 4th. 1839.

Orations were delivered by the following gentlemen:

1. William M. Overton, A. B. of Lunenburg, on the probable fate of our institutions.

2. John A. Coke, A. B. of Williamsburg, on the progress of the United States.

3. Richard Ivanhoe Cocke, L. B. of Powhatan, on the former character and present condition of Virginia.

4. Benjaman Blake Minor, L. B. of Spottsylvania, on the circumstances which contribute to the rise of great men from obscuity.

5. Thomas Blackwell, A. B. of Lunenburg, on the probable influence of the U. States on the destiny of the world, together with a valedictory address to the Patrick Henry Society.

After the orations were concluded, the President proceeded to confer the degree of A. B. upon the following gentlemen:

Thomas Blackwell of Lunenburg.
John B. Cary of Hampton;
John A. Coke of Williamsburg;
Wm. H. Fitzhugh of Stafford;
Benjaman F. Garrett of Williamsburg;
Henry Harrison of Charles City;
James B. Jones of Chesterfield;
Alexander Jones of Chesterfield;
Charles W. Montague of Gloucester;
William M. Overton of Lunenbnrg;
Edmund Randolph of Amelia;
Julian C. Ruffin of Petersburg.

And the degree of L. B. on the following gentlemen:

Herbert A. Claiborne, Jr. of the city of Richmond;
Richard Ivanhoe Cocke of Powhatan;
William W. Crump of the city of Richmond;
Thomas B. Donnelly of Williamsburg;

Washington Greenhow of the city of Richmond;
Edward Gresham of King & Queen ;
J. Warren Griggsby of Rockbridge ;
Benjaman Blake Minor of Spottsylvania ;
John Poindexter, Jr. of Louisa ;
Austin M. Trible of Essex.

Certificates of proficiency, under the College seal, were then awarded to the following gentlemen :

Benjaman E. Booth of Surry, Junior Mathematics.

James E. Brooks of Richmond, Chemistry.

Thomas H. Bullock of Lynchburg, Junior Moral Course, Chemistry and National Law.

Nathaniel C. Cocke of Prince George, History, Natural Philosophy, Mathematics and Metaphysics.

Walter W. Coke of Williamsburg, Chemistry and National Law.

George P. Coleman of Williamsburg, Junior Moral Course, Chemistry, Natural Philosophy and National Law.

Daniel A. Daly of Mecklenburg, Natural Philosophy and Engineering.

W. R. Drinkard of Petersburg, Mathematics and National Law.

G. R. Dupuy of Petersburg, 1st half Junior Moral Course, Junior Mathematics, Chemistry and National Law.

Charles J. Fox, King & Queen, Metaphysics.

John H. Fox of York, History and National Law.

Wm. W. Glenn of Baltimore, Junior Mathematics and National Law.

Wm. H. Gwathmey of King William, History, Political Economy and Metaphysics.

James Hamilton of North Carolina, Junior Moral Course, Chemistry, National Law and Metaphysics.

Thomas Harrison of Sussex, Junior Moral Course, Chemistry, National Law, Mathematics and Engineering.

W. S. Hawkins of North Carolina, Chemistry.

A. Hill of Petersburg, History.

A. L. Jarvis of Matthews, Chemistry.

Wm. R. Johnston of Fredericksburg, Junior Mathematics.

Edmund W. Jones of North Carolina, National Law.

Warner T. Jones of Gloucester, Political Economy and Metaphysics.

Benjaman Irby of Nottoway, History, Chemistry, Mathematics and Metaphysics.

I. W. Irby of Nottoway, Junior Mathematics and National Law.

John B. Kercheval of Hampshire, Junior Moral Course and Metaphysics.

Ro. McCandlish of Williamsburg, Junior Moral Course, Chemistry, National Law and Engineering.

D. E. Meade of Dinwiddie, 1st half Junior Moral Course, Chemistry, Mathematics and Engineering.

G. C. Medley of Halifax, Junior Moral Course, National Law, Political Economy and Metaphysics.

John Minge of Charles City, Junior Moral Course, Junior Mathematics, Chemistry, National Law and Engineering.

John E. Moore of Brunswick, History.

Edmund C Murdaugh of Williamsburg, History, Chemistry and National Law.

George U. Nottingham of Northampton, Junior Moral Course, Chemistry, National Law and Mathematics.

A. L. Pegram of Dinwiddie, Junior Moral Course, Chemistry and National Law.

W. R. Pierce of Williamsburg, Junior Moral Course, Junior Mathematics, Natural Philosophy and National Law.

David W. Pitts of Alabama, History.

William G. Pollard of King William, Junior Moral Course, Chemistry and National Law.

Winston Radford of Lynchburg, Chemistry, Natural Philosophy and Engineering.

James H. Rawlings of Spottsylvania, Junior Moral Course, Chemistry, National Law and Mathematics.

John W. Reins of Richmond, Engineering.

G. W. Richardson of Richmond, Junior Moral Course, National Law, Political Economy and Metaphysics.

Powhatan Robertson of Richmond, Junior Moral Course, National Law and Mathematics.

William Robinson of King & Queen, Natural Philosophy.

Wm. H. Scott of Georgia, Junior Moral Course and Metaphysics.

W. B. Seawell of Gloucester, Junior Moral Course, Chemistry, National Law and Metaphysics.

Churchill Semple of Williamsburg, Junior Moral Course, Junior Mathematics, Chemistry and National Law.

William H. Sims of Halifax, Junior Moral Course, Chemistry, Natural Philosophy and Metaphysics.

T. L. Skinner of North Carolina, Junior Moral Course, Junior Mathematics, National Law and Engineering.

Jabez S. Smith of Petersburg, Junior Moral Course, Junior Mathematics.

Orlando M. Smith of Lunenburg, Junior Moral Course, Chemestry and National Law.

Sydney Smith of York, Junior Mathematics and Chemistry.

John B Stanard of Fredericksburg, Junior Moral Course, Junior Mathematics, Chemistry and Engineering.

William B. Taylor of Surry, Natural Philosophy and Mathematics.

James B. Turner of North Carolina, History.

Th. S. Watson of Louisia. 1st half Junior Moral Course, National Law, Mathematics, Politicai Economy and Metaphysics.

William C. Williams of Richmond, Junior Moral Course, Junior Mathematics, Chemistry and National Law.

L. Y. Winder of York, History.

William P. Wood of North Carolina, Junior Moral Course. Junior Mathematics, Chemistry and National Law.

John J. Wright of Essex, 1st half Junior Moral Course and Metaphysics.

TO STOP A LEAKY CASK.

From the Farmers' Cabinet.

The best thing for stopping a leak in a cask is whiting, beaten up with common yellow soap; if this mixture be well rubbed into the leak, it will be found to stop it after every thing else has failed.

For the Farmers' Register.

ESSAY ON VEGETABLE PHYSIOLOGY.

By GEORGE D. ARMSTRONG, Prof. of Nat. Philosophy and Chemistry, in Washington College, Va.

[Continued from page 334.]

CHAPTER XV.

MEANS WHICH PLANTS POSSESS OF PERFORMING THEIR VITAL FUNCTIONS. 1st. CAPILLARY ATTRACTION; 2nd. ENDOSMOSIS; 3rd. IMMEDIATE VITAL ACTION.

Having given, in the preceding parts of this essay, some account of the general structure of plants, and of the nature of those elementary organs by means of which they are enabled to perform their vital functions, to absorb nourishment from the earth and from the atmosphere, and appropriate it to the production, increase and repair of their different parts, we will now attempt to determine the means by which these organs are enabled to perform their vital functions. Plants may be considered as a set of machines, by which the common elements of nature are worked up into such a form as to be fit for the sustenance of animal life. We have already examined the structure of this machine; we will now direct our attention to the way in which it operates. "In this department of the science, the difficulties which the philosopher has to overcome are of a very different character from those which may have embarrassed him in merely determining the organization of a plant. In the latter case, good microscopes, manual dexterity in preparing the parts for examination, and sufficient patience for his task, are sure to bring the observer to conclusions, the general truth of which is often susceptible of exact demonstration; but when we come to consider the causes of vital phenomena, and the manner in which they are brought about, we have obstacles of quite another kind to overcome. There is not a function of vegetable life which is not preformed as it were behind a screen; the parts which are the prime movers in every operation, are so minute as to escape our view, until they have been killed for microscopic examination--fixed to the soil, destitute of passions and sensations, the visible expressions of which might lead us to the discovery of their invisible causes--having the whole of its organic mechanism concealed beneath a skin inert and opaque—we are compelled to trust for all our notions of the manner in which a plant performs its vital functions, to inductions from data about which, in many cases, there must always, from the nature of things, be some kind of uncertainty. In such circumstances, can we wonder that great diversity of opinion has existed among physiologists respecting many of the phenomena of vegetable life; or that multitudes of erroneous theories have obtained belief almost without question."

It would be inconsistent with the character of the present essay, to notice the different theories which have been successively advanced and abandoned; such an account would properly form a part of the history of vegetable physiology, and not of science itself; and whatever interest it might possess, or whatever instruction it might afford, it could assist as but little in our present inquiry. For this reason I shall confine myself to an explanation of the several means by which the organs of plants are now believed to perform their vital functions, and afterwards, to determine, so far as the circumstances of the case permit, the extent to which these means are severally employed.

The phenomena of vegetable life are, at the present day, generally ascribed, in part to capillary attraction, in part to *endosmosis*, and in part to motions in the organs of plants, caused immediately by the vital principle. We will examine these in the order in which they have been mentioned.

1st. *Capillary attraction.* This is that species of attraction manifested by the rising of liquids in small tubes, or between parallel plates placed at very small distances from each other. The most important of those laws which govern this species of attraction, are, 1st. it is only in tubes of less than one-tenth of an inch in diameter, that this attraction is manifested to any considerable degree; and it is in those tubes which are not larger than a hair, that it is most conspicuously manifested; 2nd, the height to which water will rise in capillary tubes of different diameters, varies inversely as those diameters; 3rd, that a tube $\frac{1}{1000}$ of an inch in diameter will raise water 5. 3 inches. And since the height varies inversely as the diameter, the product of the diameter into the height is a constant quantity, viz. the .053 of an inch. From these data it is easy to determine the height to which a tube of any given diameter, will raise water; or knowing the height to which water is raised by any tube, to determine the diameter of that tube. These are laws which have been deduced from the results of experiments carefully made and frequently repeated, and we must take them as our guides in attempting to determine the part which capillary attraction acts, in the economy of vegetable life.

The rise of the sap of plants has long been ascribed principally to capillary attraction; and its descent to the attraction of gravitation. There are several very weighty objections to this way of accounting for the circulation of the sap. The first and greatest objection is, that capillary attraction is entirely inadequate to produce the effect ascribed to it. From a consideration of the third general law of this attraction, as given above, it will at once be seen that the diameter of a tube being known, the height to which water will rise in it can be ascertained by dividing .053 by that diameter expressed in decimals of an inch. The most common diameter of the ducts of plants, the only vessels which are continuous tubes, is about .002 of an inch. Dividing .053 by this, the result is 26.5 inches. The smallest of these vessels is about .001 of an inch in diameter. Such tubes would of course raise water 53 inches, or to just double the height of the former. But the sap of plants, instead of being raised only 26 or at most 53 inches, is, in the case of some of the large trees of tropical countries, raised to a height of 5000 inches. Another objection, and an unanswerable one, to this as a general theory, is that a whole natural family of plants, those termed cellular plants, are entirely destitute of tubular vessels, and yet their circulation goes on with as great, and in many instances, even greater rapidity than that of other plants. There is no plant which grows

more rapidly than some species of fungus, and yet these are cellular plants, without one single tube in their whole structure. In these instances, capillary attraction is manifestly out of the question. Another objection is, that after the death of a plant, although the tubular vessels are all perfect, as is manifested by the rise of water in a piece of dry wood which has one end placed in a cup of water, the circulation of the sap entirely ceases. For these reasons we must give up the idea that capillary attraction is the cause of the rise of the sap, or if we admit that it has any part in producing this effect, that part must be a very inconsiderable one.

There are objections equally insuperable to the second part of this theory, viz. that the sap returns by gravity. One of these objections is, that in returning towards the root, the sap has very frequently to move upwards, in direct opposition to gravity, and not downwards, in conformity with that force. This is manifestly the case in twigs which put out from the lower side of limbs, and, for at least a part of their course, grow downward. On almost every tree, a greater or less number of such twigs may be found. The twigs of the weeping willow, those parts of the tree which are growing most rapidly, and in which the sap is circulating most abundantly, always bend downward. Another objection is, that we can assign no reason why, when two tubular vessels precisely similar in their structure, and placed in similar circumstances, the sap should ascend in one by capillary attraction, and descend by gravity in the other; and if we attempt to account for any phenomenon upon mechanical principles, we must assume nothing for which we can not assign a reason. Besides, the fact that a whole class of plants are entirely destitute of continuous tubular vessels, is as fatal to the idea that the sap descends by gravity, as that it ascends by capillary attraction. I should not have thought it worth the while to have been thus particular in stating the objections to this theory, had I not known that it has been for a long time the commonly received theory, and one with which most who have ever spent much thought on the subject have become acquainted with in some form or another.

2nd. *Endosmosis.* Perhaps the simplest definition which can be given of this term is, that endosmosis is that infiltration of one fluid into another, which takes place through bodies possessed of no visible pores. Thin animal and vegetable membranes, which in ordinary circumstances are impermeable to fluids, when made to separate fluids of different densities, are traversed by those fluids with greater or less rapidity. An example or two will make the matter plainer. "Take a common half-ounce vial, the bottom of which has been ground off, and tie a piece of bladder tightly over the opening thus effected. Fill it with a solution of gum arabic in water, and place it so that its lower end is beneath the surface of some water in a glass. The denser fluid will slowly attract the water through the membrane, and the contents of the vial will run over. Reverse the experiment by filling such a vial with water, and plunge the lower end into a solution of gum, and the water will pass out of the vial, through the bladder, as will be manifested by the sinking of the water in the vial, and the rising of that in the glass." In both instances, the rarer will pass into the denser fluid by endosmosis. Again, if we blow a soap bubble with atmospheric air, and then place it in a jar of ammoniacal gas, the bubble will be seen at once to enlarge, and display a beautiful play of colors upon its surface; and on examining the gas which it contains, we will find it a mixture of atmospheric air and ammonia. In this instance the ammonia must have passed through the sides of the soap bubble, although the film which formed the bubble is in ordinary circumstances impervious to gases. It passed by the process termed endosmosis.

Many experiments have been performed to prove that the cellular tissue of plants is capable of acting by endosmosis. Of these the following one of Dutrochet may be taken as an example. One of the valves of the capsule of the balsam was placed in water; the effect was, that it curved rapidly inwards and soon rolled itself up; it was afterwards placed in thick gum water, and it then curved outwardly, in a direction just the opposite of that which it had at first taken. In order to understand this, we must bear in mind the fact that the outside of a valve of the balsam is composed of larger and thinner cellules than the inside, and of course endosmosis would go on more rapidly through the sides of the outer cellules, than through those of the inner. When the valve was placed in water, the sap which the cellules of that valve contained, being the denser liquid, the water passed into the cellules; and in consequence of the nature of the cellules, it passed more rapidly on the outside than on the inside of the valve. The necessary effect of this was, to distend the cellules on the outside more rapidly than those on the inside, and thus to curve the valve inwards. When the valve was placed in a thick solution of gum, the solution was the denser fluid, and the effect of endosmosis was to draw the sap out from the cellules of the plant. This effect from the nature of the cellules would take place more rapidly on the outside than on the inside of the valve. In this case the inner cellules would soon be the most distended, and the valve would of course curve outwards. This experiment was frequently repeated and always with similar results. By such experiments, the fact is established beyond a doubt, that the vegetable tissues when filled with sap are capable of endosmometric action.

In order to get a clear idea of the part which endosmosis is supposed to act in the circulation of the sap, let us suppose that there is a line o cellules, stretching from the root to the leaf of a plant, each cellule in contact with the ones immediately above and below it, and all filled with a fluid of uniform density. The uppermost cellule of the series being in contact with the atmosphere, and exposed to the action of the sun and of the air, the sap which it contains will part with a portion of its water by evaporation, and will thus be rendered more dense than that of the one below it. In accordance with the principle already stated, endosmosis immediately commences, tending to render the sap contained in the two cellules of equal density, in part by the passage of the denser fluid downwards, and in part by the passage of the rarer fluid upwards. In this way the fluid which the second cellule of the series contains will be rendered more dense than that of the one immediately below it, and endosmosis commences between these too, tending to render their fluids

of equal density; and so on to the end of the series. At the same time that endosmometric action commences at the upper end of the series, a similar action will commence at the lower end. The lower cellule filled with dense sap and placed in contact with the water contained in the soil, will at once commence attracting that water to itself, and in this way its sap being rendered rarer than that of the cellule above it, will be transferred in part to that cellule, and so on to the end of the series. Both of these operations, tending as they do to move the sap in the same direction, will conspire to produce the same result, viz, the raising of the sap from the root to the leaves. Again; let us suppose that there is a series of cellules extending from the surface to the heart of a tree, each cellule being supposed, as in the other case, to be in contact with those next it in the series, and all filled with a liquid of uniform density. By evaporation the liquid in the outer cellule of the series is rendered more dense than that of the one next it; it immediately commences an endosmosis upon that cellule, abstracting from it a part of its rare fluid and imparting in return a part of its own dense fluid; this second one operates in the same way upon the third, and so on. Such is in fact the condition of the cellules of a plant, and such is one of the ways in which their sap is believed to circulate. It will be perceived that endosmosis accounts for the motion of the sap in every direction, upward, downwards, and laterally; and moreover for two opposite motions, through the same set of vessels, and at the same time. It also accounts for a circulation in cellular plants, and the cellular parts of other plants, such as the pith and medullary rays. In all these respects it agrees with the results of direct observations. Without attempting to determine the extent to which the circulation of the sap is properly attributable to endosmosis, we will dismiss this subject for the present, as we shall have occasion to recur to it again.

3rd *Vital action.* Besides the effects which can be fairly ascribed to endosmosis, there are others which we must attribute to motions in the organs of plants caused immediately by the vital principle. It is certain that movements do take place in the organs of plants, which appear to be in no way connected with endosmosis. An instance will be afforded by cutting in two a stalk of lettuce. The milky juice contained in the cellules of the bark will be found to exude from the extremities of both portions of the stem. This cannot be caused by a power exerted from below, for then the sap would exude from the lower portion only; neither can it be caused by the gravity of the sap, for then it would exude only when the part had its extremity turned downwards, whereas in fact, it flows out with equal rapidity, in whatever position the stalk may be placed. This effect can spring from no other cause then from a contraction in the sides of the cellules. Another and a still more striking instance, is afforded by the cellules of the leaf of the lettuce during the flowering season. Let a leaf be touched ever so slightly, so as not to break the cuticle, the milky juice will nevertheless exude and form a large drop.

The force with which the sap is propelled through the stem of a growing plant is much greater than we are generally in the habit of considering it. This matter has been the subject of some curious and instructive experiments, of which the following, from Hales' 'Vegetable Statics,' may be taken as an example. "April the 6th, at 9 A. M., rain the evening before, I cut off a vine on a southern aspect, at 2 feet 9 inches from the ground; the remaining stem had no lateral branches, it was $\frac{7}{8}$ inch in diameter; I fixed on it a mercurial gauge. At 11 A. M. the mercury was risen 15 inches higher in the open leg, than in the one attached to the end of the vine, being pushed up by the force of the sap which came out of the stem. At 4 P. M. it was sunk on inch. April 7th, at 8 A. M. was risen very little, a fog; at 11 A. M. 'tis 17 inches high, and the fog gone. April 10th. at A. M. mercury 18 inches high; I then added more mercury so as to raise the surface to a height of 23 inches; the sap retreated very little into the stem, upon this additional weight, which shows with what an absolute force it advances; at noon it was sunk one inch. April 11th. at 7 A. M. 24½ inches high, sunshine; at 7 P. M. 18 inches high. April 14th. at 7 A. M. 20½ inches high; at 9 A. M. 22½, fire warm sunshine; here we see that the warm morning sun gives a fresh vigor to the sap. At 11 A. M. the same day 16½, the great prespiration of the stem makes it sink. April 16th. at 6 A. M., 19½ inches, rain; at 4 P. M. 13 inches. April 17th, at 11 A. M. 24¼ inches high, rainy and warm; at 7 P. M. 29½ warm rainy weather, which made the sap rise all day, there being little perspiration by reason of the rain. April 18th. at 7 A. M. 32½ inches high, and would have risen higher had there been more mercury in the gauge; from this time to May 5th the force gradually decreased. The greatest height of the mercury being 32⅔ inches; the force of the sap was then equal to 36 feet 5⅓ inches height of water. In another like mercurial gauge (fixed near the bottom of a vine which ran 20 feet high), the mercury was raised by the force of the sap 38 inches, equal to 43 ft 3⅓ in, height of water; which force is about five times as great as that of the blood in the great crural artery of a horse, seven times as great as the force of the blood in the like artery of a dog; and eight times as great as in the same artery of a fallow doe." In the results of the above experiment there can be no error; the measurement of a propelling force by means of a mercurial gauge is one of the most accurate and most unexceptionable methods of measurement which we possess. The force with which the sap was driven upwards, in the last mentioned instance was equal to more than 20 lbs. to the square inch. To recur to the orginal question; what cause can we assign for so powerful a propulsion of the sap as is here indicated? Endosmosis will account for it in part; but it appears to me that we must admit an alternate contraction and dilatation of the cellules themselves as one principal cause.

Perhaps some may object to this explanation on the ground of the stiffness of the vegetable textures; but let it be recollected that this stiffness exists, not in the cellular and vascular tissues, the tissues through which the circulation takes place, but in the woody fibre, which is disposed throughout the plant for the purpose of giving strength and consistency to the vegetable structure. The membrane of which the celluler and vascular tissues are composed, is soft, yielding, and in every way fitted for such alternate contractions and dilatations as are supposed.

Should it be objected, that although the texture of these vessels is such as to fit them for such a work, yet we can conceive of no way in which the vital principle, be that principle what it may, can operate so as to produce this effect. In answer, I would say, neither can we conceive of the way in which the vital principle operates to produce similar dilatations in the heart of man; and yet we know from actual observation that such effects are produced. These notions take place as long as the man remains alive; the moment he dies, they cease at once; hence we ascribe them to the immediate agency of the vital principle; and although the way in which what we have termed the vital principle produces this effect is an inexplicable mystery, and in all probability will ever remain such, yet we never think of calling the fact that such motions do take place, in question, on that account.

But it may be further objected, that these motions in animals appear to be inseparably connected with a nervous system; and that no such system exists in vegetables. This remark is not strictly true. "The nervous system, which is very distinct from all others in animals of the higher classes, gradually tends to divide; and finally, one is forced to admit, that in zoophytes the nervous matter is diffused, as it were, throughout the whole body, so that they possess a kind of universal sensibility, without there being any where a nervous system distinct from the tissues." If such is ascertained to be the fact with respect to zoophytes, why may we not go a step further; and suppose that in vegetables the nervous matter is uniformly diffused, or, what amounts to the same thing, and will perhaps appear less objectionable, that the tissues are constructed in such a way as to be capable of performing so many of the functions of a nervous system, as are necessary in the economy of vegetable life. There is no essential difference in the composition of the most perfect nervous system, and the other parts of the animal body, which would forbid such a supposition. They are all composed of the same elements, and differ only in the manner in which those elements are organized. The fact, that when certain poisons are made to enter vegetable systems, or when plants are killed by electricity, the tissues at once stiffen and become entirely incapable of circulating the sap, favors this idea. But whatever explanation we may give of the matter, the facts of the case seem to require, that we admit the existence of alternate dilatations and contractions in the tissues of plants, produced immediately by the vital principle.

Chapter XVI.

Food of plants. Water. Carbonic acid gas. Nitrogen. Other substances found in plants.

In speaking of the composition of vegetable substances, chemists distinguish between their proximate and ultimate principles. The ultimate principles of vegetables, are the simple elementary substances of which they are composed, such as carbon, oxygen, &c. The proximate principles, are those compounds into which these elements are united by the action of vegetable systems, such as, gum, resin, sugar, &c. The ultimate elements of which all vegetable substances are composed, are but few. Carbon, oxygen and hydrogen, are the only ones which exist in any considerable quantity, and where others enter, they seem to enter rather as accidental, than as essential ingredients. The proximate principles are very numerous, and every year, the researches of the chemist are adding to their number; yet as they are all made up of pretty much the same ultimate elements, they must of course, resemble each other closely in comparison. In order that a plant may increase in size, it must be supplied with carbon, oxygen and hydrogen, which may be considered the raw materials of the vegetable fabric, and of course the food of plants must contain these elements, either in a separate state, or in such compounds as the organs of the plant shall be able to decompose.

It was at one time believed that pure water was capable of sustaining and nourishing plants, and that in fact it was their only proper food. This opinion was founded in part upon such experiments as the following of Von Helmont. Having placed a young willow in a box containing a known quantity of pure sand, and supplied it plentifully with water, it was found to increase in size very rapidly. After being suffered to grow for a time, it was removed, and the sand carefully weighed; when it was found to have undergone no perceptible variation in weight. Hence, it was inferred that the plant was nourished by the water alone. It was afterwards suggested to this experimenter, that in as much as he used common spring water, that water might contain other substances in solution. He repeated the experiment, using distilled in the place of common water, and the plant died. But without the decisive result of the last experiment, we might be satisfied that the opinion was erroneous, from our knowledge of the composition of water. Water consists of oxygen, and hydrogen, and nothing else. Now, if pure water is the only proper food for plants, whence is it that they are to obtain their carbon, an element which enters largely into the composition of every part of the vegetable structure.

The fact seems to be, that what may properly be called the food of plants, because it is that without which they cannot exist, is atmospheric air, together with water, containing carbonic acid gas in solution; and these alone are sufficient for their support. Water has the power of absorbing and retaining a large portion of many of the gases; of carbonic acid gas, recently boiled water will absorb its own volume. Placed as water in ordinary circumstances is, in contact with the atmosphere, which always contains a greater or less portion of carbonic acid gas diffused throughout it, it will always, when subjected to examination, be found to contain a portion of this gas in solution. It is probably in this way that the greater part of the carbon which exists in vegetables, is introduced. This carbonic acid is derived from many sources; but principally from the decomposition of the various organic substances which lie buried in the soil, or scattered upon its surface. All vegetables, when they rot, or undergo decomposition, are resolved principally into water, carburetted-hydrogen and carbonic acid; and it is to their ability

to supply this last mentioned substance, that putrescent manures owe their nutritive properties. If we look at the effects of such manures, we will find that their energy is proportioned to their capability of forming this acid. "Yeast, for instance, which is one of the most active of these manures, is so from possessing, beyond all other substances, the power of exciting fermentation, and thus of causing the formation of carbonic acid from the vegetable matter which lies buried in the soil."

It is only in the state of carbonic acid that carbon can enter into the system of a plant. If a plant is placed in solid carbon, and watered with distilled water, it might as well be planted in powdered glass, so far as its growth is concerned. Sir H. Davy placed a plant of mint in water mixed with carbon in a state of impalpable powder, and he found that not a particle could enter the roots. When carbonic acid enters the system of a plant, it suffers decomposition, its oxygen being liberated and its carbon fixed in the tissues. This has been proved by many very satisfactory experiments. If fresh gathered leaves be placed in water, and thus situated, be exposed to direct sunlight, they will soon be covered with minute air bubbles, which if collected and examined, will be found to be pure oxygen. The earliest observers of this circumstance supposed these bubbles to be liberated from the water by the heat of the sun; for when leaves were placed in water which had been deprived of the air which it contained by boiling, no bubbles appeared. The correct explanation of this fact is, that in such circumstances, there is no carbonic acid furnished by the water for the plant to decompose.

De Candolle has proved that the oxygen we collect in such cases, arises from the decomposition of carbonic acid in the following manner. He placed in a pneumatic cistern filled with distilled water, two inverted glass jars; one of which was filled with the water of the cistern, and had floating in it a plant of mint; the other contained carbonic acid gas. To prevent all absorption of carbonic acid from the atmosphere, the surface of the water in the cistern was covered with a thick layer of oil. The whole apparatus thus arranged was exposed to direct sun-light. The carbonic acid soon began to disappear, but just as fast as it disappeared from one vessel oxygen appeared in the other. In order to understand this experiment it is necessary to bear in mind the fact, that the elements of carbonic acid are condensed into one-half their original volume when they combine with each other. If 100 cubic inches of oxygen unite with 100 cubic inches of the vapor of carbon, they will not form 200 cubic inches of the resulting compound, but each being condensed into one half its original volume, they will form but 100 cubic inches. Just the reverse of this takes place when carbonic acid is decomposed; every 100 cubic inches of carbonic acid will furnish 100 cubic inches of oxygen, and 100 cubic inches of the vapor of carbon. This explains the fact that oxygen appeared in one bell glass just as fast as carbonic acid disappeared from the other. He afterwards varied the experiment by substituting oxygen for the carbonic acid in the second glass. In this case no gas was given off by the plant, neither did any of the oxygen disappear; thus proving that plants have a specific power of absorbing carbonic acid, and after decomposing it, of retaining the carbon and rejecting the oxygen; and that the oxyen given off by growing plants is derived from the decomposition of carbonic acid.

Two conditions appear to be necessary for the successful repetition of this experiment. 1st. That the plant should be green and living, since it has been found that recently killed, but still green plants, emit no gas. 2nd. Exposure to direct sunlight, for neither the clear light of day, nor that of the brightest lamp produce any effect. From some experiments recently performed, it would seem that this effect is due entirely to the chemical part of the ray of light. It has long been known that a ray of solar light was composed of three distinct and separable rays, viz, a luminous ray; a heating, or as it is more commonly called, a calorific ray, which is not luminous; and a chemical ray which is neither heating nor luminous. By a certain contrivance, it is easy to absorb any two of these rays, whilst the third is suffered to pass on undisturbed. By subjecting a plant to each of the three rays in succession, it has been found that it is the chemical ray alone which is capable of producing any effect. These facts should be borne in mind by any one who may wish to repeat the experiments of De Candolle.

Although all experiments combine to prove that carbonic acid is the most essential of the elements on which plants are nourished; yet water is also a necessary part of their food. It is true that a large portion of the water taken up by a plant is lost again by evaporation, yet accurate experiments show that a portion of it actually enters into the composition of the plant. Saussure found that when plants were grown in close vessels, in an atmosphere containing a little carbonic acid, the weight which the plant acquired in a given time, was much greater than that of the carbon produced by the decomposition of carbonic acid, and this could be accounted for in no other way than by supposing it to have fixed a considerable quantity of water; thus plants of the *vinca*, which in a vessel without carbonic acid had gained 1¾ grains from water only; acquired 5 $\frac{8}{10}$ grains when they were at the same time able to procure carbonic acid. That water is an essential part of the food of plants, may be learned from the fact, that almost all the proximate principles contain hydrogen, an element which does not exist in carbonic acid, and of course cannot be furnished by it. The water which enters into the composition of a plant, probably enters without undergoing decomposition. On this subject Prof. Lindley remarks, "as it has been pretty well made out that all the oxygen given off by plants, is produced by the decomposition of carbonic acid, and as no one has ever been able to detect the emission of hydrogen by any plant except mushrooms, it is inferred that if the water which is consumed by plants is ever decomposed, it is in the formation of the various proximate principles which contain more oxygen (viz. acids,) or more hydrogen (viz. oils,) than water; but as the greater part of vegetable substances, such as gum, sugar, fecula, &c., contain oxygen and hydrogen in the same proportion as water, it can hardly be doubted that the water undergoes no decomposition, but is simply fixed."

"It was formerly thought that nitrogen or azote had nothing to do with the nourishment of plants; and that, in those cases where it was met with, it

was merely in a state of separation from the atmospheric air which had been inhaled and deprived of its oxygen and carbonic acid. But its constant occurrence in combination with the tissue of mushrooms, and cruciform plants, in gluten, and in what chemists call vegetable albumen, and also in the vegetable alkalies, seems a sufficiently strong proof of its contributing in some way or other, to the nutrition of the vegetable system." In what condition the nitrogen enters the system of a plant, is a question which has never as yet been satisfactorily settled. The most probable answer is, that it is absorbed by the leaves, from the atmosphere. At any rate, this much is certain, that leaves do absorb much gaseous matter from the atmosphere, and that nitrogen exists in very large quantities in the atmosphere; according the best analyses $\frac{73}{100}$ of our atmosphere are nitrogen. It is probable that a portion also enters in solution in water, like carbonic acid. It is true, that nitrogen is by no means as soluble in water as carbonic acid, water dissolving only about $\frac{2}{100}$ of its bulk of nitrogen; but yet when we call to mind the vast quantity of water which passes through the system of a plant during its growth, and remember at the same time the small extent to which nitrogen enters into the composition of vegetables, we will see that no inconsiderable portion of it may have entered in this way. It is possible also, that a portion of nitrogen may enter, in combination with other substances, and be afterwards separated from its combinations, and fixed by the vital action of the tissues of the plant; in just the same way in which carbon is separated from its combination with oxygen in carbonic acid. There are several compounds which experience has proven to be very valuable as manures, which contain nitrogen. Ammonia is one of these; its composition is, by weight, 3 parts of hydrogen to 14.15 of nitrogen. The salts of ammonia exist in large quantities in common soot, and this is known to be a very active manure. It is true that soot is generally classed among stimulating manures, but may it not be that it stimulates the growth of a plant, simply by furnishing one of its necessary articles of food? What renders this opinion the more probable is, that soot is found to be a manure particularly efficacious in the case of cruciform plants, (*i. e.* plants whose flowers consist of four petals arranged in the form of a cross, such as the cabbage, turnip, &c.,) and these are the plants which contain the greatest quantity of nitrogen.

Besides carbonic acid, water, and nitrogen, which form what may with propriety be called the food of plants, there are several earthy and metallic substances, which are taken up from the soil in considerable quantities, by certain plants, and afterwards deposited in their tissues. About the part which these substances act in the economy of vegetable life, we know but little. "One of the most remarkable of these is silex, which is secreted by certain plants in very great quantities. All grasses abound in it; usually it fixes itself in the cuticle; but in the bamboo it is also deposited in considerable quantities in the hollow joints, under the form of the substance called tabasheer. The skin of the rattan palm, abounds so much in silex that it will strike fire with steel; the same substance exists in teak and other kinds of wood, to which it gives a peculiarly gritty texture; and in the scouring rush, *(equisetum,)* one species of which is used for polishing wood, in consequence of its whole surface being composed of compact silicious particles. It was once thought that silex must be actually formed by the action of the vital principle of vegetation; but further investigations into the nature of silex, have shown that in certain circumstances, silex is soluble in water, and it is more probable that it is in this way that it enters plants. Considering the immense quantity of water that passes through a plant in the course of its growth, there is no difficulty in conceiving the possibility of the largest quantity of silex, which is ever met with in plants, being introduced in this way." But even if we could not account for the introduction of silex into plants, we could by no means admit that it was formed by the vital action of plants themselves; inasmuch as with such an admission, we must also admit that plants possessed, either a creative power, or else a power of transmuting one of the simple elements into another; an admission which contradicts the best established laws of chemistry.

Lime, magnesia, potassa, soda, sulphur, phosphorus, and several of the metals, occur in many plants in greater or less abundance; all evidently taken up from the soil. "Of these soda is the best known and most abundant, existing to the amount of as much as 55 per cent., in the form of a carbonate in the ashes of a species of sea-weed *(salsola sativa;)* and copper, the least suspected and most curious. This metal is stated by De Candolle to form eight parts in a million in coffee, and about four and a half parts in a million in wheat; whence he has calculated that there is annually imported into Europe more than 1200 lbs. weight of copper in coffee, and that the French annually consume nearly 8000 lbs. in their bread.

Our knowledge of the nature of the food of plants, will enable us to explain some facts which have been established by experiment, for instance, the manner in which clover improves land, and may perhaps suggest other rules to the practical agriculturist. Had we no experience on the subject, it would seem, to say the least, improbable that any crop could improve land. We would naturally suppose that plants were nourished by the ground itself,—that they fed upon the soil. If such be the case, when a crop is ploughed under and dedecays, it can give nothing but what it has first taken; and how then can it improve land? Yet we find that growing clover upon land, and then ploughing it under and suffering it to decay, is one of the very best methods of improving land. Bearing in mind the nature of the food of plants, this admits of a very simple explanation. We will suppose that clover is sown upon a perfectly barren spot. The atmosphere which is above this spot contains a portion of carbonic acid gas, for all atmospheric air contains a greater or less portion of it. A rain comes; as it falls, it absorbs a portion of this gas, and in this condition enters the ground. No sooner does it come in contact with the seed in the first instance, and with the root afterwards, then it is absorbed and its materials used for increasing the size of the vegetable structure. When the portion of air above the spot, has in this way been exhausted of carbonic acid, a supply is obtained from the neighbouring portions in consequence of that strong tendency which gasses possess, to intermix and diffuse themselves

throughout each other. This process is repeated again and again, and thus the clover increases in size. But whence is this gas obtained? From many sources; from the breath of animals, for whilst animals inhale oxygen they exhale carbonic acid from the burning of most combustible bodies, but principally from decaying vegetables such as are found in the woods and along the fence sides. The quantity of the several elements which enter into the composition of our globe is fixed; it is impossible for man either to increase or diminish this quantity; and it is also impossible for him to convert one of these elements into another. All he can do is to make an economical use of that which already exists, to gather up those portions which subserve no valuable end and apply them to use. This is what the farmer does in sowing his land with clover. He impresses the very wind into his service, for every wind which sweeps over a field of clover, laden as that wind is with the materials of which vegetables are formed, is made to contribute to its growth. After a large portion of vegetable matter has in this way been collected upon the once barren spot, it is ploughed under, and secured for future use.

It is a fact well ascertained, that animals, whilst they inhale a large portion of oxygen, exhale a large portion of carbonic acid. From the long continuation of this process we would suppose that the composition of our atmosphere would in the course of time suffer a material change; that it would become so surcharged with carbonic acid as to be unfit for the support of animal life. And yet so far as we can ascertain, the composition of our atmosphere is very much the same now that it was a thousand years ago. In what way is this uniformity of composition preserved? If we call to mind the nature of the food of plants, the matter admits of a very simple explanation. Plants take in carbonic acid, and retaining the carbon fixed in their tissues, return the oxygen to the atmosphere; a process just the reverse of that performed by animals. In this, we see one of those beautiful compensating arrangements with which creation abounds.

Chapter XVII.

ELABORATION OF THE SAP. NATURE OF PROXIMATE PRINCIPLES. INFLUENCE OF LIGHT. INFLUENCE OF HEAT.

By the elaboration of the sap, is meant, its conversion, from crude sap, into the several proximate principles of which vegetables consist, such as sugar, gum, resin, tannin, &c. In order to understand this subject, and also, how it is that such substances as compose the food of plants, are capable of being connected into the various proximate principles which the vegetable kingdom presents, it will be necessary, in the first place, to attend to a few general facts respecting the composition of these proximate principles. Among the most important of these facts are—

1st. That they are all composed of pretty much the same elements, and frequently contain those elements in the same proportions.

2nd. That they are all decomposed with facility, and frequently are mutually convertible into each other.

3rd. That in general they cannot be formed by art.

We will examine each of there general statements, somewhat in detail.

1st. The proximate principles of vegetables are all composed of pretty much the same elements; and frequently contain these elements in the same proportions. This will be evident from an inspection of the following table, prepared from a statement of their compositions as given in Turner's Chemistry. The numbers opposite the names of the substances refer to their equivalents; if it is desired to find their composition in grains, the numbers for oxygen must be multiplied by 8, for carbon by 6.12, for nitrogen by 14.15, and for hydrogen by 1.

Vegetable Acids.	Carbon	Hydrogen	Oxygen	Nitrogen
Oxalic acid,	2	—	3	—
Acetic "	4	3	3	—
Citric "	4	2	4	—
Tartaric "	4	2	5	—
Gallic "	7	3	5	—
Malic "	4	2	4	—
Racemic "	4	2	5	—
Vegetable Alkalies.				
Morphia,	34	18	6	1
Cinchonia,	20	12	1	1
Quinia,	20	12	2	1
Aricinia,	20	12	3	1
Sugar,	6	6	6	—
Starch,	6	6	6	—
Alcohol,	4	6	2	—
Oil of cloves,	20	13	5	—
Camphor,	10	6	1	—

From an inspection of the composition of the substances mentioned in the above table, it will be seen that several of them consist, not only of the same elements, but contain those elements in the same proportions, or, in the language of chemistry, are isomeric. This is explained, by supposing that whilst the different substances contain the same elements, that yet those elements are differently united with each other. An example will make this plain. Suppose that we have one equivalent of sulphur, four of oxygen, and one of copper, to combine; these may readily be so united as to form two entirely distinct compounds; two equivalents of the oxygen may unite with the one of sulphur and form sulphurous acid; and the remaining two with the one of copper, forming binoxide of copper; these two binary compounds then uniting would form the sulphite of the binoxide of copper; or three equivalents of oxygen may unite with the one of sulphur, forming sulphuric acid, and the remainiug one with the one of copper, forming protoxide of copper; these two binary compounds then uniting would form the sulphate of the protoxide of copper, a compound entirely different from the former. Or expressing it in chemical symbols, we might have

$$(S + 2\,ox.)\,(Cu + 2\,ox.) = S + Cu + 4\,ox.$$
$$\text{Or } (S + 3\,ox.)\,(Cu + ox.) = S + Cu + 4\,ox.$$

It is in this way that the difference between the different isomeric substances with which we meet in the vegetable kingdom, is supposed to be produced.

2nd. The proximate principles of vegetables, all readily undergo decomposition, and are frequently convertible into each other. Most vegetable sub-

stances, when placed in a warm damp atmosphere, undergo a series of changes, which result in their entire dissolution. When thus decomposed, they are not, however, separated into their ultimate elements, viz., carbon, oxygen, hydrogen and nitrogen, but into certain simple binary compounds of these elements, among the most abundant of which are, carbonic acid (c + 2 ox.,) water (h + ox.) light carburetted hydrogen (c + 2 h,) and ammonia (3 h + n). Those which are not thus decomposable, will all undergo decomposition at a temperature less than that of a white heat. They are also frequently convertible into each other; for instance, starch, which is isomeric with sugar, is readily convertible into that substance, and does in fact undergo such a change during the germination of the seed; this is no more than we should expect from our knowledge of their composition.

3rd. In general, vegetable substances cannot be formed by art. Although we are perfectly well acquainted with the composition of sugar, for instance; we know that it is composed of 6 equivalents of carbon, 6 of hydrogen, and 6 of oxygen, and we can easily procure such of these substances, and present them to each other in just the proper proportions to form sugar, yet in no way which has yet been discovered can we cause them so to unite as to form that compound. That this should be the case with those substances which possess a distinct organization, is not a matter of surprise, but that it should likewise be the case with those which possess no other than a crystalline structure, is probably to be attributed to the imperfection of our knowledge of vegetable chemistry. We cannot indulge a reasonable hope of ever being able, by any process of art, to form cotton from simple inorganic carbon and water, although we know it to be composed principally of those materials; but we may indulge a hope that, when our knowledge of chemistry is more complete, we may discover a way of forming sugar from carbon, oxygen and hydrogen, either by the direct union of these elements, or else of some of their binary compounds; at least, there is nothing absurd in the indulgence of such a hope. But whatever may be the fact in time to come, it is certain that we know of no process by which they can be formed at the present day; and this should be borne in mind in examining into the elaboration of the sap, as we must not expect to find that it is effected by any process which has an exact parallel in the arts.

We are now prepared to discuss the question, by what means are plants enabled to effect the elaboration of their sap. As that sap enters the root, it is a thin fluid consisting principally of water containing carbonic acid gas in solution; from this raw material, in some way or another, plants are enabled to form all the components of the vegetable structure, the wood, the starch, the sugar, the gum, the oil, the resin, the acids, &c. The question is, by what means is it that plants are enabled to effect these changes. To give a full and complete answer to this question, is impossible in the present state of our knowledge of vegetable physiology; yet there are some facts which have been ascertained by experiments carefully performed and often repeated, which it may be important to the practical agriculturist to know.

The most important of these is, that many of those chemical changes which constitute what is termed the elaboration of the sap, are effected through the agency of solar light, or if not by its direct agency, it is necessary to enable the plant to effect them. How it is that light is able to change the chemical relations of substances, so as to cause those to combine, which would otherwise have remained separate; or to cause those to separate which would otherwise have remained combined, is a matter of which no satisfactory explanation has ever as yet been given; and yet there is no fact in chemistry which is better established than that it does act in this way. If a bottle partly filled with nitric acid, be set away in a dark place, it will undergo no change; but if it be exposed to direct sun-light, a decomposition of a portion of the acid at once commences, and the whole of the upper part of the bottle will soon become filled with a mixture of oxygen and nitrous acid. If a mixture of equal volumes of chlorine and hydrogen be enclosed in a bottle, and light be carefully excluded, no combination will take place, it matters not how long they be thus kept mixed; but if the mixture be exposed to diffuse day-light, the two gases will gradually combine, and form hydrochloric or muriatic acid; if the mixture be exposed to direct sunlight, the combination takes place as instantaneously, and with as violent an explosion, as if caused by the contact of flame or by the electric spark. These facts, and numerous others of a similar character, which might be mentioned did it seem necessary, establish beyond question, the principle that light does possess the power of so altering the ordinary chemical relations of bodies as to cause combinations and decompositions which otherwise would not take place.

The principal agency of light appears to be exerted in effecting the decomposition of carbonic acid, and in fixing the carbon thus obtained, in the tissues of the plant. Some of the evidence on which this statement rests, has been given in a preceding chapter; I will here add only a few remarks of De Candolle, in which he has embodied the results of numerous experiments performed by himself. "If" says he "two plants are exposed, one to darkness, and the other to the sun, in close vessels and in an atmosphere containing a known quantity of carbonic acid, and are removed at the end of twelve hours, we will find that the first has diminished neither the quantity of oxygen nor of carbonic acid; and that in the second, on the contrary, the quantity of carbonic acid has diminished, while the quantity of free oxygen has increased in the same proportion. Or if we place two similar plants in close vessels in the sun, the one in a vessel containing no carbonic acid, and the other in air which contains a known quantity of it, we shall find that the air in the first vessel has undergone no change, while that in the second will indicate an increase of oxygen proportioned to the quantity of carbonic acid which has disappeared; and if the experiment is conducted with sufficient care, we shall discover that the plant in question has gained a proportionable quantity of carbon. Therefore we conclude that the carbonic acid which has disappeared, has given its oxygen to the air, and its carbon to the plant, and that this effect has been produced solely by the action of solar light." All the experiments which have hitherto been made, lead us to the same conclusion that solar light is absolutely necessary to plants, to

enable them to digest the crude matter which they obtain from the soil.

"The fixing of carbon by the action of light contributes in an eminent degree to the quality of timber; a point of no small importance in all countries. It is in a great degree to the carbon incorporated with the tissue, either in its own proper form, or in combination with other elements, in the form of resinous or astringent matter, that difference in quality in the timber of the same species of tree is principally owing. Isolated oak trees, fully exposed to the influence of light, become a tougher and more durable timber, than the same species growing in dense forests; in the former case its tissue has been solidified by the greater quantity of carbon fixed in the system during its growth. There is every reason to believe that the brittle wainscot oak of the Black Forest, Eng. is produced by the very same species as the solid naval timber of Great Britain." The results of chemical analysis confirm this opinion, as will be seen by noticing the quantity of carbon obtained form different kinds of wood, as given in the following table.

Cormonna-wood -	55	per cent of carbon.
Iron-wood - -	53.44	"
Oak - - -	52.50	"
Beech - - -	51.45	"
Box - - -	50	"
Willow - -	49.80	"

"It is to the power which sun-light possesses of decomposing carbonic acid, and fixing the carbon in the tissues of the plant, that the direction which the branches of a tree assume, is generally to be ascribed. When a branch first protrudes from a stem, its own weight would bend it downwards, if it were not for the effects of light from above, which solidifies the part exposed to it. Let any one expose a green branch in such a way that light strikes it only on one side; the tissue on that side will fix the most carbon, will become harder and lengthen less; while the tissue of the opposite side, fixing less carbon, will harden less, and lengthen more; the consequence of which will be that the branch will be eventually turned towards the light. This will explain the uniform tendency of the green parts of plants to turn towards the light."

Besides fixing simple carbon in the tissues of a plant, light appears to exert a very important and necessary agency in the production of many of the proximate principles of vegetables. Of its influence in the production of the various kinds of coloring matter, and also, of the odoriferous principles, I have already spoken, when treating of those subjects. To the formation of starch, a substance into the composition of which carbon enters very largely, sun-light appears to be necessary. It is to the starch which they contain, that potatoes, corn, and many other plants, owe most of their nutritive properties. Potatoes grown in the dark, are always watery, in consequence of no starch being developed in them; and indeed the quantity of nutritive matter which they contain, is, in other circumstances, proportioned to the intensity of the light to which their leaves, (the organs in which the elaboration of the sap is principally effected,) are exposed. When orchard-ground is undercropped with potatoes, the quality of the potatoes is never good, simply because so large a quantity of light is intercepted by the leaves and branches of the orchard-trees, as to retard the formation of starch. The formation of the milky juices of many plants, appears to depend upon the presence of solar light. As these milky juices are frequently poisonous, it is a matter of great importance to prevent their formation, where the plant is intended to be eaten. Hence the common practice of blanching, as it is called; which is in fact nothing more than excluding the sun-light from the plant, to prevent the formation of certain substances which would have been formed, had sun-light had free access to the plant. Hence too, the safety with which the young shoots, which have but just protruded from beneath the ground, are eaten, when the same plant if eaten at any subsequent period of its growth, would have been highly deleterious.

Another of those facts which the practical agriculturist should bear in mind, is that temperature has great influence over the elaboration of sap. The agency which heat exerts in this process, is no doubt, to be attributed principally to the evaporation of watery fluids from the crude sap, which it necessarily causes. It has long been known that a very large portion of the water which is absorbed by a plant is afterwards lost again by evaporation. Indeed such it will at once appear, must be the case, if we call to mind the fact, that all the solid components of vegetables must enter them in solution of water, and that many of those solids are soluble to but a very small extent, in that fluid. It is possible, perhaps we might say probable, that heat also exerts a direct agency in causing combinations among the elementary substances, of which plants are composed. There is no known agency which is more powerful than that of heat, in effecting changes in the chemical relations of bodies; hence it is that the chemist, in almost every operation, depends upon its assistance. When we know that heat does exert so powerful and so universal an influence as this, in those chemical operations which are effected by the art of man, it would seem but a reasonable inference, that nature also would make use of it, in those more complicated, and as they seem to us, more mysterious operations, which art may in vain attempt to imitate.

But in whatever way heat may affect the vital action of plants, it is certainly true, and every one's observation will convince him of the fact, that it does exert a powerful influence over those vital actions. It is only when the temperature of the air is raised sufficiently high, that the vital energy of a plant is excited. Although light is necessary to perfect the growth of a plant, and to the formation of many of those proximate principles which plants contain, yet if a plant be exposed to an elevated temperature, though it be in total darkness, that developement of its parts and consequent increase in size which we denominate growth, will certainly take place. The influence of heat appears to be exerted immediately upon the stem and leaves, and through them, upon the root. Hence it is, that when one branch of a vine growing in the open air, is introduced into a hot-house, the temperature of the hot-house excites the buds into action; they immediately attract fluids from beneath them, and thus the whole system is put in motion, although the parts of the vine-plant beyond the house, are exposed to all the in-

clemency of winter. "De Candolle has proved by a simple experiment, that in such a case as this, the fluid consumed by the young leaves is really attracted from out of the cold earth, and not absorbed from the atmosphere of the hot-house. Having selected a young tree with two principal branches, and two principal roots corresponding to them, and adapted to each root a bottle of water, he found that the bottle attached to the root corresponding to the branch which had been introduced into the hot-house was quickly emptied, while that attached to the root corresponding to the branch in the open air remained nearly full. It may be supposed that in a natural state of things, some effect is produced upon the roots by the warmth of the soil; but it is doubtful whether this amounts to much if indeed it is of any importance; for provided only the earth is not frozen, it appears from experiments, that heat applied to the branches alone, is quite sufficient to determine and maintain all the phenomena of growth.

Besides the influence which light and heat may exert in effecting the elaboration of the sap, there is much which in the present state of our knowledge, we are obliged to ascribe to the immediate agency of the vital principle. What peculiarity there may be in the structure of one cellule which determines it to secrete resin, whilst another by its side secretes an acid—or whether it is any thing in the structure of the cellule which determines the result, are questions which we cannot solve. The most careful microscopic observations have discovered to us no difference in structure, and disclosed no peculiarities in operation. In such circumstances, all that we can say is, that they appear to be produced under the immediate agency of the vital principle; or perhaps we would come nearer to a simple statement of facts, and our statement would be less liable to objection, should we say, that they take place while the plant is alive, and cease the moment that it dies. It must be confessed that this is but a poor apology for an explanation; and yet it is, in fact, all that is known respecting the matter. There are many things in the structure and vital action of plants, which, with all our knowledge of nature, we cannot fully explain.

(To be continued.)

ADVANTAGES OF EMBANKING THE TIDE MARSHES OF MARYLAND.

For the Farmers' Register.

Improvement in the agriculture of this section of country is now gradually advancing; many marl banks have been opened, and worked, though not with steady perseverance; kilns of oyster shells have been burnt and strewed, and in some few instances stone lime has been imported, the profits of which, when the cost is calculated, I deem a little doubtful.

The extensive marshes in our tide-water district, in their present condition, form the principal impediment to rapid improvement. It is there that malaria, that frightful scourge of our native population, and the terror of strangers, is concocted. By reclaiming our low grounds, we should greatly improve the health of our country, increase its wealth, and expel the present troublesome holders, musquitoes, snakes, minks, and musk-rats. Their title is merely possessory, and not better than that of the native Indians. Vattel held, and his dogma has been received by many of our practical jurists, that savage nations who mix no labor with the soil, but depend upon the spontaneous fruits of the earth, and the beasts of the forests, to supply their wants, may be justly expelled by a more thrifty race, who, instead of the bow and the tomahawk, use the axe, the mattock, and the rifle.

Many of my acquaintances have gone to the west and south, in pursuit of fortune. I have a strong and abiding affection for my native state, where our fathers lived in peace, and in honor, and where in the rare instances in which injury was punished by requital, the manner in which it was conducted lessened the horrors of the act. In addition to my local attachments, in my youth I had a strong objection to having my head disfigured by an Indian tomahawk, and in more mature age I should feel equal reluctance to receive a gentle squeeze from Judge Lynch.

To reclaim our marshes has long been with me a favorite project. If my memory serves me, Swift was contemporary with Marlborough, Bolingbroke, Harley and Wharton, distinguished patriots of that day; and yet he, who had weighed and measured these illustrious men, and many others of equal merit but of lesser note, gave it as his opinion, that he who should cause two blades of grass to grow, where but one grew before, rendered more service to mankind than the whole race of politicians. Now if my poor counsels should prevail, and call up a spirit of improvement by which timothy and herds grass should be made to grow where flags and rushes grew before, I think in justice I may claim to be preferred to subtreasurists, bankites, and conservatives; the goodness of whose intentions it would be uncharitable to doubt, as they all declare that their great object is to promote the general welfare, by giving the people a sound unfluctuating currency. It is deeply to be regretted that men who desire to do right should so widely differ as to the means.

It appears from the Register that your theory is, that the marshes of the Chesapeake, consisting of vegetable matter, upon being ditched and dried, would rot away. The earth I believe is the foundation of all vegetable growth, of which from the tides, and the floods, there is a regular accretion. I have lived long enough to have seen parts of marshes without the aid of art reclaimed from the tide, and produce the grasses of the upland. It is certainly true that a large portion of our marshes, like those of eastern Virginia, consist of decayed vegetables, mixed with earth; but I have learned from respectable authority, that some marshes on the Delaware, in character like ours, upon being ditched, dried and sown in herds grass, become firm and cohesive, and produce excellent crops; this grass by its tenacious roots forms a strong turf, which affords protection against the sun, and frost, and perhaps if Mr. H. Carter, instead of cultivating his reclaimed grounds for seven successive years in Indian corn, (thereby exposing them naked to the sun and frost,) had laid them down in herds grass, he would have experienced a different and more beneficial result.

By a communication to the Register a year ago, I learned that the marshes of Lincolnshire, and the fens of Romney, have been reclaimed by the

means of wind mills. This is certainly a most beneficial application of the wind; and I apprehend the same means would produce the same result in the marshes of the Pocomoke, Nanticoke, and Choptank. Maryland is a state small in extent, and limited in means, but her projects are vast, and her views magnificent. By internal improvements she calculates to secure the entire trade of the Susquehanna, a large portion of the Ohio and Mississippi, and to divide with New York and Quebec the riches of the western lakes. Maryland has stated her credit for many millions on canals, and rail-roads, and it would well become her fostering genius to expand her wings, and to apply a few hundred thousands to reclaim her waste marshes. Many of them are still vacant, and the state holds the title; those which have been granted, she might appropriate to herself, by condemnation. When the work was accomplished, and these now barren wastes are set in timothy and herds grass, the state could sell them out at a heavy advance, which would not only pay the costs of the wind mills and ditches, but would leave a heavy profit to the state. This is not a scheme of mere total profit, but of general utility; the western shore would feel the benefits, which would perhaps extend to Philadelphia, and New York; thousands of fat bullocks would be brought into market, from lands which are now worse than useless. The odious monopoly of western graziers, (which I much fear the patriot butchers of Baltimore will be unable to dissolve,) would be at an end, and the Baltimorian would eat beef of very superior quality at low rates. Eastern shore men know, though western shore men do not, that cattle, which can eat salt and fresh grass, and drink salt and water, at pleasure, fatten quicker and make viands more savory, than those of the high country, where salt is dealt out with a parsimonious hand. Salt in its congelation, either by the power of the sun or fire, contracts impurities of which it is clear in its aquous state; and pure sustenance is as necessary to the health of of a beast as to a man. The principal sanative ingredient in the waters of the Saratoga spring is salt, which has never been successfully imparted to medicated waters. It is for these causes that Governor Stevens' sheep are the crack of the Baltimore market, and so much preferred by the epicures to these raised on Elkridge, and Big Pipe creek. To this another important consideration may be superadded; Maryland holds a deep stake in the Eastern Shore Rail-Road, which she increased last session, and which she will probably continue to increase, until it shall be finished, as the private stockholders, either for want of faith, or want of funds, commit heavy forfeitures, and if peradventure when the road is finished, the great communication between the north and the south, should take another direction, the loss might be compensated by taking fat beeves to market in the cars. They would arrive in Baltimore fresh and unjaded, and in fine killing condition, and the risk of being drowned, or blown up from steamboats entirely avoided.

If our salt marshes were reclaimed, and set in timothy and herds grass, the Eastern Shore of Maryland for its extent of territory would become the most valuable in the United States; the hardy Germans, the laborious Dutchmen, and the sturdy Irish, who now go trooping to the west, attracted by the smell of fine sweet hay, which they love almost as much as the smack of whiskey, would come into our country; this supply of free labor would enable us to send our blacks to Cape Palmas. The abolitionists would have to go further south for experiment, and in the height of our prosperity, with fine salt-water navigable rivers, abounding in fish, oysters and wild fowl, and a fine level rail-road, we would laugh at the vain babblers of the great valley of the Mississippi.

TIMOTHY.

E. S., Md., 26th June, 1839.

EARTH WORMS—MOULD.

From the Genesee Farmer.

The increasing number of earth worms (*lumbricus terrestris*) in the cultivated parts of our country, has drawn the attention of many farmers to the subject, and elicited some inquiries as to the effect of their presence in such numbers in soils that are cropped. The opinion of some seems to be, that while they confine themselves to the soil, they are harmless, if not actually beneficial. Loudon says that this worm, "unless existing in great numbers in a single place, cannot be ranked among injurious animals, notwithstanding the prejudices of farmers and gardeners against them. Without worms, the earth would soon become hard, cold, incapable of receiving moisture, or of giving nourishment to roots. They are, in fact, the great promoters of vegetation, by boring, perforating, and loosening the soil beneath, and by manuring it above with their excrement, which is thrown up into lumps called worm casts." It is to this latter process, the throwing upon the surface of these casts, or excrementitious matters, as they are supposed to be, that some modern writers have attributed the formation of mould, or that part of the earth which is of the most value in supporting vegetation.

Mr. C. Darwin, F. G. S., in a paper read before the London Society in 1837, was the first, we believe, to reduce this theory to a form, by an explanation of the manner in which this worm is supposed to produce the results attributed to it. His attention was called to an examination of the process by finding that some fields over which lime and cinders had been spread on grass land, and which had never been ploughed, were found, after intervals of twelve or fifteen years, to have these coarse materials covered with mould to the depth of three inches.

'This layer (of cinders and lime) was in some places so continuous, that the superficial mould was only attached to the red clay subsoil by the longer roots of the grass.'

"On carefully examining between the blades of grass, in the fields above mentioned, the author found that there was scarcely a space of two inches square, without a little heap of the cylindrical castings of worms. It is well known that worms swallow earthy matter, and that having separated the serviceable portion, they eject the remainder at the mouth of their burrows."

With all deference to the opinions of Messrs. Loudon and Darwin, we are disposed to dissent from both, and believe that the earth worm is more or less injurious, according to its numbers; and

that the agency it has in the production of mould is very limited, if indeed it is sensibly felt at all.

We imagine the opinions of practical farmers and gardeners in matters that belong purely to observation and fact, are entitled to great respect, however unable they may be to give reasons or philosophize on such facts. Now we have never known a farmer or gardener that did not consider the earth worm a nuisance; and scarcely one that did not think that they were exhausters of the nutritive qualities of the soil in which they abound. That they bring earth to the surface cannot be denied, but that such earth is rendered more valuable by being divested of its nutritive qualities (or 'serviceable portion' of Mr. D.) in its passage through the worm, may well be questioned. Nothing, it seems, is added to the earth; the matter on which the worm subsists is taken from it; and from the circumstances in which the worm is found, and propagates in the greatest numbers, it seems plain, that the parts of the soil the most essential to plants, are precisely those on which the worm exists. We have no evidence that the worm is injurious by attacking or feeding on the roots of plants; the injury is effected by diverting from them the nourishment they would otherwise receive. Different kinds of vitality cannot well exist in the vicinity of each other; it is a law of nature, that the weaker and less perfectly organized, must give way to that which is higher in the scale, and hence the roots of plants are ilfy fitted to contend with the more voracious lumbricus.

We are equally skeptical, as to the alleged fact of our being indebted to the earth worm for the mould with which the face of the earth is covered. We think such is not the case, because no where is the richest mould more plentiful than in places where an earth worm was never known to exist. New countries are notoriously destitute of earth worms. Every one who remembers the original soil of this country when the forest were first removed, will recollect the abundance of mould, and the total absence, except in some few places, of the earth worm. We loved to fish in those boyish days, (we have not entirely lost the relish yet,) and well remember the difficulties we were compelled to encounter in procuring worms for bait. They then existed only in little miry spring spots near the lakes, and old, black looking, antediluvian fellows they were. They first began to make their appearance some ten years after the settlement of the country, around barns, and in yards where manure and animal matter kept the earth rich and moist, and they have now in some places taken possession in millions of our lowlands, gardens, &c. Places heavily manured are the most infested by them, as the young worms, or the ova, are brought with the manure applied. Instances are recorded in this journal, in which these worms have so accumulated around houses and in wells, as to render the water unfit for use. Their presence in wells is to be accounted for from the habits of the animal. When there has been a summer shower towards evening, as soon as it is dusk the worms issue from their burrows, throwing up numerous casts in clearing their holes from the washings of the rain, and creep in every direction over the surface. Penetrating every opening where moisture exists, the well serves as a trap for them, and in such openings they accumulate till necessity compels the owner to clear out his well, and thus free himself for a time from the nuisance. Where they appear in such numbers, close curbing and banking is required to shut them out.

Quick lime would undoubtedly destroy them, could it be applied to them in that state; but ensconsed in their burrows, lime spread on the surface does not reach them. Perhaps applying it pretty liberally along the walks of a garden, or between the rows of plants, after a shower, and while the worms were on the surface, might kill some of them; but probably the most effectual remedy will be ploughing so late that the ground will freeze hard immediately after the work is done; and using no manure that has not been piled and heated by fermentation to such a degree as to destroy what worms and eggs may be existing in the mass.

SILK CULTURE COMMENCED IN UPPER CANADA, BY A LADY.

By the following letter it will be perceived that the silk culture has reached Canada, and has found, at least, *one* active and efficient practical advocate. We wish there were *many such*,—and from the zeal manifested by the lady writer, we have no doubt that we shall, ere long, be gratified with the intelligence, that others, are following the example of our fair pioneer, in this laudable enterprise. Should the Canadas become a silk growing country, (and we see no reason why they may not,) this lady will have the proud satisfaction of being the prime mover, and patroness of this elegant and useful production, and her fellow citizens must unanimously pronounce, that she "has deserved well of her adopted country."—*Ed. S. C.*

St. Thomas, U. C. May 6th, 1839.

F. G. Comstock, Esq.—*Sir*:—From the interest you feel in the culture of silk, and the pains you take to diffuse knowledge in every branch of it throughout the United States, I presume you will not be entirely indifferent to a solitary experiment in Upper Canada. Frigidity seems to be associated with the very name of Canada—even Canadians themselves imagine that the climate north of the lakes is not congenial to the mulberry tree, except the black, of which there are fine trees in the forest, which are transplanted for the fruit. Five years since, I sowed the first seed, (I suppose,) that was ever deposited in Canadian soil, in full faith, that it would do well. I offered seed to others, and assured them, that where Indian corn would grow, that the mulberry would, (and more plentiful crops I have never seen in any part of the United States I have been in, than are here produced,) and that if the culture of silk could be made a profitable business in Vermont and Maine, it certainly could here; but one person only, has been induced to sow the seed, and he has a fine nursery of fourteen or fifteen thousand trees, from seed planted two years ago. The profit was no object with me, my premises being too circumscribed to realize any thing in that way. Last summer, I had the satisfaction of demonstrating that both the climate and soil of Upper Canada are congenial to the culture of silk, and the pleasure of exhibiting to all who had the curiosity to call, the first silk-worms reared and the first silk made, from the first mulberry trees cultivated in either of the provinces; and feel myself amply paid for time and cost, in having been

able to do it. Resolved to serve a thorough apprenticeship, I superintended the cultivation of the mulberry, and devoted all my time to the worms, guided entirely by the directions in your valuable paper, and Mr. Cobb's Manual, having never seen any thing of the business. The woms were as large as are described, and perfectly healthful, of which I had 2000, and between 200 and 300; not more than 10 or 12 died, and those during the last moulting. The silk is strong and of a fine lustre. The worms commenced their labors on the 28th day, and on the 31st, ten cocoons were formed. The thermometer during the time of their existence, except two nights, was between 70 and 80° hanging in the house.—St. Thomas is in Lat. 42½° and 8."

Apprehending I had too great a number of worms for the foliage, I did not very closely examine the litter, and had it thrown upon the hedge; between 20 and 30 worms were discovered there, which grew even faster than those in the house, until they had attained half their size, when they, one after another, disappeared, till they were all gone except two, which grew larger than those in the house, and had begun to form a cocoon, but the next morning both were gone; they were carried off, I suppose, by birds, as no dead ones were ever found. I have been thus circumstantial, that if any one else should be induced to attempt the culture of silk in this province, and apply to you, sir, for your opinion of success, to furnish you with information of one successful instance. At present, the public mind is too much occupied with warlike turmoils, to take any interest in this new branch of rural economy, but I think there are some individuals, whose skepticism is removed and who will undertake it.

I have already given you a longer communication than I intended, yet I am desirous of informing you of the management of a part of my hedge, the exact manner of which, I have not seen in the Culturist, and may possibly be of use. Two years ago, I employed an English gardener, to transplant some seedlings to complete the hedge around the premises; he suggested to me that setting them in the same way they practised in England with the thorn, would be the best way to cultivate the mulberry; and I directed him to set a part of the plants in that manner, which so far exceeded the others, in rapid growth and luxuriance, I regret the whole had not been done in the same way. He says, they ought to have been cut off last spring within about 3 or 4 inches of the roots, which I have had done this. He first threw the earth up with a spade, as the beds are for garden vegetables, about six inches, and laid the plants horzontally six inches apart, and covered them with 7 or 8 inches of mould,* and then put down another layer between the first plants, and covered them about 8 or 9 inches deep.

I am happy to hear of the progress of the silk culture in the U. S., and feel a peculiar interest in the success of my own native state, Massachusetts, and should be much pleased to see the Canadians engaged in the same business, and imitating the zeal and enterprise of their translake neighbors.

Most respectfully, Sir,
Your most obedient,
BETSY M. BOSTWICK.

* Leaving one bud on the edge uncovered.

THE NEWEST AND GREATEST HUMBUG YET ANNOUNCED.

From the Maine Farmer.

Gigantic Clover.—A late number of the London Globe, contains the following account of a new species of clover, the seed of which has just been brought into that country from Asia:

"A gentleman has just arrived from Georgia, who has brought with him a new collossal and prolific clover seed from Buckhara, which he is going to submit to Mr. Loudon. According to the accounts of the most celebrated travellers, who have visited that distant and important country, which is equal in climate to Great Britan, all grains, herbs and vegetables distinguish themselves by their gigantic growth. The clover seed just imported, grows to the enormous height of twelve or fifteen feet, and can be cut every month: But this is not the only valuable property of this most extraordinary production of the vegetable kingdom. Out of the stem a hemp is prepared, which is so highly esteemed in the distant region of of which it is a native, that preference is given to it over all other sorts.

Should the plan succeed in England, and of which there can be but little doubt, it will form a new era, by rendering this country independent of foreign supplies of clover seed. It is fortunate that it has arrived in time to be tried this year. It must be sown in April. It is said that each grain will produce 300,000 seeds."

We advise the humbug dealers of this country, such as have originated the selling of "Chinese tree corn," *for charity*, and are selling multicaulis seed, &c. &c., to hasten by all means to possess themselves some of these wonderful clover seeds; or, if that cannot be done, to *call* some other seeds by the same name, which will perhaps serve as well—especially if they should be carefully *baked*, or otherwise sufficiently heated, before being sold, to prevent the purchasers being disappointed in the *character* of the product. But whether baked or raw, they should of course be sold without any guaranty of the character or vitality—and for at least as high a price as *two-crop mammoth silk-worms eggs*—or otherwise we doubt much whether the greatest demand will be secured.

ADVANTAGE OF LATE SOWING OF BEARDED WHEAT.

To the Editor of the Farmers' Register.

Madison, June 21st, 1839.

Having uniformly failed in the culture of bearded wheat, without knowing at the time the cause, and knowing that many others have been as unsuccessful as myself, I have determined to assign what is said (and what I believe) to be the cause. *It is early seeding.*

When I commenced farming some six or seven years ago, I was induced to sow twenty bushels of this wheat, which in consequence of being on wet land, was sown as early as the 10th or 12th

of October. Its appearance in the fall and early in the spring was beautiful; but it quickly declined, and I do not think that I reaped twenty bushels. On the contrary, a friend of mine sowed a lot of four or five acres last year, which was seeded some time in December, which is now the finest crop of bearded wheat I ever saw, although it did not come up until this *spring*.

Upon inquiry I find that our neighborhood furnishes other instances of its successful culture when sown late; when upon the old system of early sowing an abundant crop of disappointment was the farmer's only return. I feel confident, Mr. Editor, that the above fact will be well known to many farmers, but still there are many to whom it will not be, to whom it will be important, as almost every farm has some land upon it, which yields no other wheat crop worthy of the farmer's attention.

Whilst on this subject, I will suggest to your subscribers the propriety of a free interchange of ideas on agricultural subjects. Most farmers seem to forget that there are constant additions to our agricultural ranks of those whose previous occupations have debarred them from that experience which is necessary to insure success, and that this deficiency can only be supplied by the experience of others, disseminated through our agricultural journals. It is this which gives an importance to many seeming unimportant facts, as the relief which many a novice has gained, when in trouble, will abundantly attest.

QUINTUS BARTOW.

N. B. For fear that some may be misled with regard to the time of sowing (as December is mentioned above) I must say that from the 1st to the 10th of November is with us preferred.

SILK-WORMS FED ON WET LEAVES.

To the Editor of the Farmers' Register.

I have noticed for some past every thing written on the subject of feeding and raising silk-worms, that I could come across; and I believe the practice of feeding worms on wet leaves has been universally condemned; but in defiance of all the reasoning on the subject, and the condemnation of wet food, I have followed it, so far at least, with great success. I have never raised a great many worms it is true, but it may be supposed, what would affect a large number ought to affect a small number. I will give you the manner in which mine were fed, and you can exercise your own pleasure about believing what I state, though if necessary I can bring ample testimony to establish every word I say. I do not wish to be understood, however, as recommending wet food as the best for silk-worms; but my opinion is, that wet leaves, occasionally, when it cannot be avoided, does no injury to them; as, for instance, in the long season in May, such as we had this year, my worms did not suffer at all that I could observe, from comparing them with others, where a good deal of pains had been taken. I gathered leaves for my worms every day 'till I would have a sufficient quantity left to pass over one or two days; and as soon as they were brought home, if in the morning they were sprinkled with water and laid in the shade, (for I have no cellar,) and if brought at evening they were put out on the grass in the yard for the dew to fall on them to keep them moist; and with these wet leaves the worms were fed four times a day, as much as they would consume; and out of a lot of 10,000 I am confident that I did not lose more than fifty, save some that got injured by moving them about; for I had no fixtures at all for them except some boards. About 5000 of these worms, however, had been half raised before I got them; but when they came to me they shared the same fare with the others I had, of the same age, but considerably larger, and spun something earlier. Finding that the worms appeared to eat more greedily the moist leaves, I continued to moisten them and keep them so, and I never saw worms grow faster, or do better.

Last year I raised sixty worms only; and from a few days after hatching, they did not know what a dry leaf was, and they did remarkably well. In fact, the leaves, for this small parcel, for longer preservation, were kept sunk in water, and merely shaken well when about to be used. Of these worms, only one was lost (being killed by falling,) and the other 59 spun good cocoons, and furnished as many moths. Of these 12 only were females; out of their product I had this year between 3000 and 4000 worms. I did not pay as much attention to them as I did to the lot of 10000, in keeping them as well fed and cleaned; and out of this lot I lost about 100, (that died,) but I do not think more; I do not attribute the loss of this 100 to the wet food, but to the filthy state I let them get into; they were not changed from the old hurdles or cleaned off for nearly three weeks. Had the same pains been taken with the last as with the first lot, it is my candid opinion not one would have been lost from disease. The cocoons were firm and good, (better than those exhibited here by Mr. Gay as the best quality of northern cocoons,) but were smaller than the others, orange-colored, from the gray worms. These are white worms, and the cocoons of pale straw color. I am now feeding a few from the second hatching this year, and I make it a point every time they are fed to wet the leaves, this I do to test the thing thoroughly; they are doing very well as yet, though they are small, and they have not come to the most critical period of their life; if they do well, and you think it worthy of notice, I will let you know.

If these remarks are worth your attention you can use them as you please.

Respectfully,

A. L. ARCHER.

Petersburg, July, 1839.

[Mr. Archer is mistaken in supposing that feeding with wet leaves has been *universally* condemned—though the practice has been tried by but very few persons, and still fewer have reported favorably. Among these few, though not in the Farmer's Register, is our correspondent, T. S. Pleasants, who this spring fed part of his first hatching on wet leaves, for experiment, and, like Mr. Archer, found no ill effect therefrom. But though not universally, the practice has been very generally and very strongly condemned, and certainly by every author who has written directions

for silk-culture. This precept first came from Europe, and doubtless is necessary to be strictly observed in that moist climate. If not necessary here, or at least if it may be partially neglected without certain loss—and that the experiments of Messrs. Pleasants and Archer go conclusively to establish—the fact furnishes a new proof of the great superiority which we have in the greater dryness of our climate, which seems to counteract the evil of too much moisture in the food and litter. Without supposing that there is any *benefit* to the worms in the water given, there will be a great gain to the feeder in his being relieved of all the trouble of drying, and delay in feeding, usually caused when the leaves are made wet by rain. The most interesting part of this statement, is that two successive generations of worms have been thus fed almost exclusively on wet leaves.

Though Mr. Archer is a young silk-culturist, and has had very little opportunity to gain instruction from experience, there is no better authority for facts, and his testimony on this fact is as conclusive as if he had stored up all the existing knowledge, and errors, to be found in books, and also in old usages. If he had been previously more fully instructed and strongly impressed by all established authority, he would probably never have made this interesting and useful experiment, of a practice, which all authors, from Dandolo down to D'Homergue, would have pronounced an egregious error, which could not have any other than fatal effects. This is is one of the thousands of cases, which we so much wish that all our readers would imitate, in which even a beginner, a mere novice in a particular agricultural pursuit, may make observations and ascertain facts, the communication of which will afford new and important light to long experienced and the best informed culturists. There are very few observing men, who cannot teach some new and useful truths; and there are still fewer, even of the best informed farmers, who are too wise to be instructed by the communication.—Ed. F. R.

REMARKS ON THE USEFULNESS OF BIRDS IN AGRICULTURE AND GARDENING.

By G. Ord.

From Loudon's Gardener's Magazine.

I have been reflecting much upon the conversation which we had together, a few evenings ago, on the subject of the usefulness of birds to agriculture. The farmers of Great Britain, as well as those of North America, are influenced by prejudices which a little investigation of the economy of nature would tend to remove. The rook is by many esteemed a noxious bird; and yet his services, in the grub-destroying way, are beyond estimation. There is no knowing what would be the disastrous result of his extirpation. The common sparrow is a favourite bird with me. Were I an English farmer, I should encourage this industrious and lively little fellow to take up his abode with me, under the full persuasion, that the little grain he would devour would be more than compensated by the thousands of harmful insects that he would destroy. The sparrows have entire liberty at Walton Hall, the seat of our friend, Charles Waterton, esq.; but we hear no complaint of their depredations. Even of the choice fruit they take but a little, and this is not begrudged them by their generous protector.

When residing in the interior of Pennsylvania, I made an interesting experiment. Being fond of rearing poultry, I had a large stock at seed-time, between four and five hundred domestic fowls. My wheat field was near the house, and my farmer maintained that, unless the fowls were locked up, there would be no crop. Not being disposed to imprison my favorites, I gave orders to sow a piece of ground alongside the barn, about half an acre, with wheat, for the sole use of the poultry. I must confess that I did not suppose many grains would have the liberty of vegetation, so thorough a scratching did the place undergo. However, the wheat began to spring, and gave indications of a crop. When the grain was ripe, my farmer said he thought it was worth cutting, as it appeared to have received but little injury from the fowls. In short, the damage done by the fowls did not, in our estimation, amount to two bushels of wheat, whilst we had the benefit of the produce of the poultry in eggs and chickens, of far greater value than what they destroyed in the way of grain; to say nothing of their invaluable services in the insect-destroying way. My farmer was greatly astonished; and confessed that the *hens*, as he called them, were not so destructive as he had always imagined they were. I must observe that it was my practice to feed regularly my poultry; under the persuasion that a good meal was quite as beneficial to the fowls as to myself. Let all those who attend to rural economy pay attention to this matter, and they will find their interest in it.

In my late journey into Holland, I had the gratification of observing the good feeling of the Dutch, with respect to the feathered creation. Their fondness of the stork is well known; but they also protect the rook, the jackdaw, the wood pigeon, &c. In Rotterdam, I lodged in a hotel, situated on the quay of the Meuse, called the *Boompjes*. This quay is ornamented with a row of venerable trees, which are inhabited by jackdaws, ringdoves, starlings, and sparrows; all living in friendship, building their nests and rearing their young, in perfect security. A stranger, unaccustomed to such a spectacle in a busy commercial city, would be surprised, as I certainly was, on being awaked, at early dawn, with the cawing of the daws, the chattering of the starlings, and the cooings of the doves, in a place where no sounds would be expected but those which are the concomitants of a maritime port. Whilst sitting in my window, to enjoy the morning air, the ringdoves would alight within a few feet of me, without manifesting the least alarm; thereby affording me an opportunity of admiring the graceful form, and glossy plumage,

of this beautiful bird. I really envied the Dutch their happiness in this particular.

London, May 10. 1839.

NOTE ON THE JALAP PLANT OF COMMERCE.

By D. Beaton.

From Loudon's Gardener's Magazine.

At the last November meeting of the Botanical Society of Edinburgh, Dr. Graham stated that *Ipomœa purga* is now believed to be the plant which produces the true jalap of commerce. That he received a tuber of it from Dr. Christison, which flowered freely in a stove, and proved to be quite distinct from the *Ipomœa* a hitherto in cultivation in our stoves as the jalap plant. In the *Annals of Natural History* for this month, in which I read a notice of the above meeting, the authority for the specific name *purga* is not stated, and I cannot find it in any work to which I have access. The true *Ipomœa, or Convolvulus Jalapa,* was cultivated in the Chelsea Botanic Garden in Miller's time. After his death, the plant was lost to that garden, and to the collections of this country. Sometime afterwards *Ipomœa macrorhiza* usurped the place of the jalap plant in our stoves. Curious collectors latterly had each his jalap plant in his stove. At Haffield, we had our jalap plant, but not *Ipomœa macrorhiza,*

My present esteemed employer received a few tubers last year from his Mexican collector: they were from Xalapa; and from the appearance of their foliage, when they began to grow, I took them to be a species of *Dioscorea,* (the venation of the leaves in that genus being no index to its botanical affinity), and paid little attention to them. One I kept all the season in the *Cacti* house where it flourished well, and seemed quite at home, but did not flower; another I planted in the open garden, against a rhododendron bush, a good plan for all duplicate novelties from such a country as Mexico, from which both hardy and tender species have been received. This latter plant showed a considerable number of flower buds in September, in twos and threes on short peduncles in the axils of the leaves. Only one of these, however, expanded, owing to the lateness of the season; and it had a long narrow tube, and a spreading medium-sized limb of a delicate violet color; and the plant altogether appeared a graceful climber. You may guess my surprise, on sending this flower to one of the first botanists of the age, to be told that it was the plant which produced the true jalap of commerce, *Convolvulus Jalapa.* I think from this statement we may safely infer that the true jalap plant will flower better in a cool house than in the stove. I expect our plant will flower well out of doors this season, being preparing it now for that purpose. It was received last year in May, and, of course, lost much time of the growing season. If this is different from the Edinburgh I. *purga* I shall be glad to send a dried specimen of it to the Botanical Society there; but I shall learn this "time enongh" from Mr. M'Nab, I am happy to see, is one of the councillors of that society.

Kingsbury, April 6. 1839.

TO KEEP SWEET POTATOES.

To the Editor of the Farmers' Register.

Columbus, Ga.

Some time last fall, as well as I now recollect, one of your Virginia correspondents asked for information upon the subject of keeping sweet potatoes through the winter; and perhaps the writer was desirous to obtain Virginia practice; but if our Georgia plan should not be altogether applicable to your region, (I know of no reason why it should not be,) your correspondents may derive some useful hints therefrom; and though I give our plan too late for any practical use the present season, it will, if at all, be of service the coming one. There are various modes adopted in Georgia for saving potatoes, but as the one I practice, in common with many others, has always been so successful, I shall describe that only. As soon as the frost slightly affects the potato vines in the fall, (about the middle of October here,) I begin to make preparations for digging; and by the time the vines become thoroughly killed, I am prepared for the harvest. I select an elevated piece of ground, and throwing up circular mounds, or hills, twelve or fifteen inches above the common surface, the diameter of which should be about ten feet, to contain sixty bushels of potatoes. The situation and the elevation of the hills are objects of importance, to prevent the possibility of the potatoes getting wet. In order to make the potatoes lie on the hill the better, the edges should be somewhat elevated by drawing the earth from the centre, giving it slightly the appearance of a bowl. Common pine heart boards are now placed on the earth, radiating from the centre to the circumference of the hill; and on these a layer one foot thick, of dry pine leaves. The hill being now ready to receive the potatoes, I select dry, mild weather, and commence digging in the morning, and stop time enomgh in the afternoon to haul up all dug during the day; for if left out at night, the frost, if any, would injure them. If possible, the hills should be filled and completed the same day, but if not, the potatoes should be well covered with straw to protect them at night, and uncovered next morning. When the pile becomes two or three feet high, place a pole horizontally across, of sufficient length to pass entirely through the hill. A better ventilator would be an oblong box four or five inches square, with several auger holes in it. The potatoes may now be put on till the pile is about five feet high, and left in a conical form. Next, procure dry pine leaves and lay them all over the potatoes, at least six inches thick. Pine heart boards like those used at the bottom of the potatoes, are now placed over the straw, and a covering of earth six or eight inches thick, is put over the whole, and patted smooth with a spade. A small aperture should be left at the top of the hill, to assist in ventilation; or to be neater, a short oblong box may be inserted down to the potatoes, and the earth drawn nicely up to it. If a pole is used as the horizontal ventilator, the earth should be removed from below it, where it projects from the hill. All the apertures should be left open, for a few days after the operation is finished, and then only closed during severe weather, with a handful of pine leaves. Shelters should be erected over the hills to exclude the rain entirely. I consider it important to perform the whole business in dry weather. P. C. H.

ON THE CULTURE OF THE MUSHROOM.

By Alex. Forsyth.

From Loudon's Gardener's Magazine.

The mushroom is an acceptable article at table all the year round; to supply this regular demand various plans are resorted to, and that which I have proved to be the cheapest and most efficient mode I shall here detail. By cheapness, however, I must not be understood to mean that false economy which short-sighted persons practise, of saving in the first outlay, and afterwards paying a greater sum, as it were, by instalments, or yearly rent, without an adequate return, or the possession of a creditable and satisfactory article. The culture of the mushroom, in many of our gardens, is an admirable specimen of this sort of economy. Instead of building workmanlike mushroom vaults, with bricks, mortar, and cement, not subject to the dry-rot, nor to any other kind of rot, with the look and the reality of stability and usefulness, we find either ridges in the open air, covered with litter and mats, which must be taken off and put on at every gathering, or else, which is worse, the mushrooms growing in a shed behind the hot-houses, on shelves half-consumed with the dry-rot, and the wooden roof over head, as a matter of course, in the same predicament.

Preparing the Spawn.—Cake or brick spawn is the only sort that I consider worth making, and there is only one sort of materials that I think advisable to make it of, and these are, equal portions of horse-droppings, cow-droppings, and loam, well mixed, and pounded or beaten, adding just only as much water as will bring the materials to the consistency of brickmakers' moulding mortar. Then let a circular mould without a bottom, 9 in. in diameter and 2 in. deep, be placed on a table, with the wide end uppermost, and filled with this mortar and stroked level; before it is turned out of the mould, let three holes be made in each cake, with an iron-shod dibber, 1½ in. deep: the mould must be shaped like the frustum of a cone, that the cakes may easily part with it. When the cakes are all but hand dry, let them be spawned, by putting a piece of spawn about the size of a pigeon's egg in each hole, enclosing it with a little of the original mortar. Then pile the cakes in pairs, with their spawned ends together, resembling a cask; and in this state let them be cased up in brick-shaped batches, and sweated and kept up to about 85°, by placing a layer of sweet dung all around and over the batch, varying it in quantity, to obtain the desired heat. The spawn must be examined as it runs in the cakes, and when one is broken and appears mouldy all through, and smells of mushroom, it is mushroom spawn in the highest state of perfection. To preserve it, however, it must be thorougly dried in an airy loft, and kept dry for use. It will retain its properties for several years.

To grow the Mushrooms.—Collect a quantity of horse-droppings, dry them a little in a open shed, then lay a stratum of loamy turf, 2 in. or 3 in. deep, in the bottom of the bed, and over this three layers of droppings, each about 2 in. deep, rendered as compact as possible, by giving each layer a good pummeling with a hand-mallet. When the last layer is made up, thrust a few "watch sticks" into the bed, in order to ascertain when it begins to heat. When the heat is getting pretty strong, let the bed be first beaten all over, then make holes with an iron-shod dibber, 9 in. apart, and deep enough to reach the stratum of loam: these will soon cool the bed; and when the heat has declined to about 80°, the holes may be bored by a conical block of wood, to about 2 in. in diameter, at 2 in. deep, in order to receive the spawn. These holes must be filled up, to about 3 in. from the surface, with loam and horse-droppings mixed; then insert a bit of spawn, about the size of a hen's egg in each, and fill the holes up level with the surface, with the loam and droppings. The holes being closed, the heat will increase, and must be attended to: if violent, a few deep narow holes may be made to let it escape; and, if too slight, it may be aided by a covering of dry hay, or a layer of warm dung; and when all danger of violent heat is gone by, and the spawn beginning to run, put on the upper stratum of loam, mixed with a little cut hay or dry horse-droppings to make a tough firm crust, about 1 in. deep. A temperature of 55° to 60°, I consider is best for the atmosphere in the house, and about 90° of bottom heat will set the spawn actively to work. The beds must not be allowed to get too dry, a layer of moist hay will prevent this; and, if too wet, a dry atmosphere can be got by gentle fires and open ventilators, which will aid them a little: but a bed once allowed to get thoroughly wet after spawning is, in my opinion, hopeless; and such a bed I should certainly remove without loss of time. Mushroom spawn, planted in loam and dung, or in either, and screened from sun and rain in summer, will produce this vegetable in abundance; and the same materials will produce the same effect, under favorable circumstances, in winter; such as being placed in boxes or baskets in a stable or warm cellar. In gathering mushrooms for present use, they may be cut; but, if they are to be kept a few days, they must be got with the stem entire. Half-dried droppings of highly fed horses, good spawn, and a gentle moist atmosphere, are the principal things to be attended to in cultivating the mushroom.

EMIGRATION.

[Extract from the Southern Agriculturist.]

There are few of us who have not relatives or friends that have emigrated to the west, and whose flattering accounts of that region do not render us uneasy, not to say unhappy at our situation here. Many of us have been there ourselves, and their deep rich soil, their luxuriant fields, their boundless discourse of hundreds of thousands and of millions, have seldom failed to make us look back with absolute contempt upon our own barren and spiritless land. With imaginations fired by the glow which rests and shines on every thing around, many purchase at once, and return home to pull up stakes and abandon all the endearing associations of infancy, youth and manhood, for the glorious prospect of unbounded wealth in more favored climes. If any come back to look once more upon his own fields before he determines to give them up forever, and the lapse of time, the change of scene, the comforts of home and friends, wear away his first vivid impression, and deprive him of the resolution to go—still, in

most instances, the thorn rankles in his bosom, and he feels that he has made an immense sacrifice to his unfortunate attachment to the spot where an unkind destiny has cast his lot. Most probably he yet hopes, at some future period, to break away, and looks upon the soil and institutions of his father scarcely as his own—certainly as not his children's. I invite all such, and all who from the accounts of others may be troubled with this fell spirit of emigration, to follow me in the calculation I am about to make, by which I hope to convince them that the difference is not so great as perhaps they imagine. But first, let them look around and scan more narrowly the circumstances of those whom they so much envy. I do not ask them to look at men who left us with reputations impaired, or broken fortunes. To such men, almost any change is for the better, because it gives new habits, new energies, and above all, new hopes. Their gain is not to be easily estimated—it is moral rather than physical. But look at those who left here "well to do at home," to better their condition. Count their slaves, count their acres, count their children—the noblest portion of their wealth. I do not ask you to count their friends, or to trace the connections which these children may have formed, or to enumerate those sad hours which bear them back to their native land. But ask them how much clear money they have on hand each year, *after all is paid*, and then inquire how much property they can purchase with it. If you can perceive no great accession to their visible wealth or comforts, if they number no more slaves, and have no broader lands bought and *paid for*, what avails any high imaginary value, which in conformity with the fashion of that country, they may place on what they have? and how much sweeter are the bought and barren luxuries of a foreign land, because purchased with more money? Let me ask them to do one thing more if it is in their power, to go and inquire of their friends or relatives, if, laying aside all affectation, and speaking in the honest sincerity of their hearts, they do not wish they had never left their native state—nay, if they do not yet indulge the hope, vague perhaps, but very comforting, of one day returning thither.

GOVERNMENT AND AGRICULTURE IN MASSACHUSETTS.

[From the July No. of the North American Review.]

An address at the Annual Cattle shows of the Worcester and the Hampshire, Hampden and Franklin Agricultural Societies, October, 1838. By Henry Colman, Commissioner for the Agricultural Survey of the state. Boston: Otis, Broaders, & Company. 8vo. pp. 23.

Agriculture, the first pursuit of civilized man, has been the last to receive the direct attention and patronage of governments. Commerce, navigation, manufactories, the machanic and fine arts, science and letters, had commanded much respect and reached high degrees of excellence, before the cultivation of the earth, either for the purposes of profit or embellishment, found favor among the affluent and enlightened, or was deemed an object worthy of the careful consideration of statesmen and legislators. But, when nations have reached an advanced position in prosperity and refinement, and other more attractive or lucrative branches of industry have been so extended as to employ a large portion of the population, an immensely increased amount of products is required to meet the augmented demand of consumption; and the necessity of rendering the earth more prolific becomes so apparent, that what had been improvidently neglected, and was, in fact, the most substantially momentous interest of the country, at last imperiously commands the most grave consideration.

As the commercial and mechanical enterprise and capacity of England began to be rapidly developed after the accession of Elizabeth to the throne, the demand for subsistence became so much greater than the domestic supply, that vast quantities of wheat were annually imported, until, by bounties, and an improved system of tillage, the wheat crops of the island were so much increased, as not only to be sufficient for the supply of all the inhabitants, but to become a staple of exportation.

Still there was not that general and strong interest excited, for advancing the science and art of agriculture, which has been so conspicuously evinced within the last fifty years, before the great land proprietors actively cooperated for collecting and diffusing intelligence throughout every portion of the kingdom; for, although there had been several eminent writers on rural economy, from Fitzherbert, in 1534, down to the practical and admirable Tull, in 1730, whose successful experiments and valuable treatise form an era in the history of British tillage, very few of the actual cultivators of the soil bestowed any attention on the literature of their profession, till Marshall, Young, Anderson, Bakewell, and Sinclair, became distinguished, by their numerous, interesting, and invaluable publications.

But the greatest, and perpetually operating impulse was given by the establishment of a Board of Agriculture in 1793, when *Surveys* of all the counties in England, were immediately undertaken, in conformity to a method which had been suggested by Marshall, several years before, to the Society of Arts in London. The reports of the several commissioners being very voluminous, as they contained exact details relating to practical operations in every department of rural economy, digests were made to render them more available, by the indefatigable projector and collaborator in the execution of this enlarged and efficient plan for advancing the important interests of the whole country. But even in that reduced form, with the other materials which he had individually collected during a period of nearly twenty years, which had been devoted to the subject, for compiling "A Compendious System of English Agriculture," the work consists of fourteen volumes.

The expenditures of Great Britain having rapidly and immensely increased from the commencement and during the progress of the war which followed the French revolution, and nearly half of the whole revenue being derived from direct taxes and the excise, it became of still greater consequence to the land-owners and their tenants, from whom that vast amount of income was chiefly received, to render each acre more productive, by the introduction of every possible improvement in the science and art of cultivation, which genius

and skill could create or introduce, from the practice of any other age or country. Interest, knowledge, and industry were, therefore, actively and zealously united in a common cause, and the beneficial results have been truly wonderful. With a territory whose area is not a third, and whose population is only half that of France, and with a soil and climate not so propitious, the agricultural products of England are quadruple those of that empire. This astonishing difference is owing entirely to the superior methods of tillage which have been so successfully extended over the whole island, and have rendered it the most perfectly cultivated, prolific, and beautifully embellished domain, in all the appropriate appendages which a refined taste in ornamental planting can devise and execute, that has existed at any period in the history of the human race; while, in large portions of France, as well as Spain, Portugal, and many of the Italian states, no favorable change has been introduced since the time of Virgil, and the implements, as well as the whole process of management in rural affairs, is that described by the Roman bard. But, within fifteen or twenty years, the government of France has made highly commendable exertions to elevate the character and condition of its rustic population, by the establishment of agricultural and horticultural societies, experimental farms and gardens, the introduction of new plants, and awarding premiums for valuable experiments in all those departments of national industry.

The same enlightened and patriotic spirit which induced many of the most intelligent and eminent men in Great Britain to combine in an application to Parliament, to aid them in measures for facilitating their honorable efforts to render the labors of the farmer more profitable to himself and more useful to the country, was simultaneously evinced in this commonwealth, and with like happy consequences. The "Massachusetts Society for Promoting Agriculture" was incorporated soon after that which was established in England; and the example has been emulously followed in most of the counties throughout the state, while all have been encouraged and fostered by the seasonable and liberal endowments of the government. Much has been thus accomplished within the present century; but, acting from a yet more enlarged and generous policy, the executive and legislature of the commonwealth, with a munificence which reflects upon them the greatest honor, directed, two years since, an agriculture survey of each county to be made; and a gentleman was appointed as the commissioner for performing that difficult and laborious duty, who, from his attainments, industry, ardor, and practical experience, was eminently qualified for the station.

This may undoubtedly with propriety and justice be considered one of the most important measures that have been adopted since the organization of the government; for it is immediately interesting, and must be directly beneficial, not only to every citizen who depends upon the cultivation of the earth for his support, but to the whole population, of which the farming class constitutes at least seven-tenths, being, at the same time, the grand nursery and constant source of supply for filling all the other diversified occupations in society.

With a soil naturally as capable of tillage, and to as high a degree of perfection as that of any other region, Massachusetts has been dependent on other states for a large portion of the most indispensable products of agriculture, which are annually consumed; not from a deficiency of territory, for, compared with the population ours is double that of England,—nor because it is not capable of yielding a sufficient quantity to meet the demand; but mainly from an imperfect system of husbandry, and the general disinclination of the people to submit to the quiet, noiseless, apparently slow and doubtful process of acquiring an ample, independent support, by a perpetual cultivation of the earth. Besides these adverse causes, commerce, navigation, the fisheries, manufactories, the mechanical arts, and the mighty tide of emigration have made rapidly increasing drafts from the agricultural population, and thus produced a continually augmenting difference, between those who consume and those who produce, which has long since made it indispensible to expend the wealth acquired from other sources of income in procuring supplies from other parts of the union; and ultimately, so great became the disparity between the supply and the demand, that, as a nation, we have been compelled to resort to foreign countries for the first necessaries of life.

It is our duty, then, to make every possible exertion to avert such alarming conjunctures in future; for no nation can be said to be truly independent, and secure in its position and institutions which is not at all times, and under all circumstances, fully capable of furnishing food and raiment, and whatever else is requisite, for the support and comfort of the whole people.

From the first report made by Mr. Colman, there is ample testimony to warrant the assertion that Massachusetts is capable of yielding more than triple the amount of agricultural products which have hitherto been obtained. There is not a county which the commissioner has visited, that has not presented examples of tillage, and experiments in all the branches of New England culture, which fully illustrate the immense advantages that are derivable from a skilful application of science to the practical arts of husbandry. This verified and consequently most useful of all kinds of knowledge, but which has been confined within very limited and far separate circles, will hereafter be as universally possessed, through the medium of the reports on each county, as that which has been collected and published on every other subject connected with human industry; and the whole, when completed, in the lucid, exact, and satisfactory manner in which the first has been presented, will, allowing for the extent of territory surveyed, form the most accurate and valuable agricultural cyclopædia which has appeared in any country. It will include the actual operations of each individual, who has best perfected that portion of rural economy to which his attention had been most exclusively directed, from the nature of the soil, and geographical position as respects a market.

Hitherto all the publications which have appeared on agriculture, have been principally compilations from the various treatises that have been written on that all-important subject, since the period of the illustrious Columella; and, however laborious may have been the authors, and ingeniously faithful in design, or desirous of producing a work which might the most perfectly sub-

serve the purposes of the region of country for which it was intended, it is notorious to every experienced and well instructed farmer and gardener, that they have invariably failed to accomplish what had been so confidently anticipated; and it is evident to even the most superficial observer, that there is no other mode of concentrating in a really useful form the requisite information, for the general guidance of the uninstructed as well as experienced cultivators of the earth, and of enabling them to participate in the advantages which have been derived from the most approved methods of conducting the multifarious labors of a farm, than that which has fortunately been undertaken by the government of Massachusetts, and which, from what has already been done, we have the fullest confidence will be thoroughly executed. Each of the most skilful and enlightened experimentalists, whose results will be given in the reports of the Agricultural Commissioner, must have consulted the most celebrated authors, and to some extent taken them as guides, for directing them in their diversified operations; and the benefits obtained will be at the command of every citizen.

The agricultural survey is but the continuation and completion of a system, which has been projected for obtaining accurate information as to the physical geography, topography, natural history, and general statistics of the commonwealth. Massachusetts has been the first of all the states of the union, to cause a correct map to be constructed, based on the triangulation of its whole area, which involves astronomical observations for establishing the latitude and longitude of the most remarkable features and positions, and which, from the difficulties and expense to be encountered, has been applied only in France and Great Britain, to include a whole nation. Happily, however, for the navigation of the United States, the same operation is in progress, under the direction of the national government, for forming complete hydrographical charts of the coast from Passamaquoddy to the Sabine.

Connected with these important labors, a geological survey was undertaken, which has been most ably completed by Professor Hitchcock; and the other departments of natural history, including the animal and vegetable realms, have been directed to be explored, and the duty has been confided to several scientific gentlemen, from whom may be expected full and interesting accounts of the quadrupeds, birds, fishes, reptiles, insects, and plants, which are peculiar to the state.

These works will be honorable monuments of the enlightened and expanded views of the legislature, reflect lasting honor upon the chief magistrates under whose direction they have been so successfully prosecuted, and entitle the enlightened and meritorious gentlemen who have participated in the very responsible labors, to the respect and gratitude of the present and all future generations.

We have indulged so far in the general remarks which the very interesting subject of agriculture has suggested, that there is left only sufficient space to commend to the real friends of the country the instructive address which the Agricultural Commissioner delivered before the assembled yeomanry of several of the interior counties, during the last autumn. It is an impressive appeal to the farmers, urging them strenuously to endeavor to render their condition as prosperous and happy a their pursuits are respectable and important, by renewed efforts in the acquisition of intelligence, and to illustrate, by example, how independent and deserving of the highest consideration are those, who zealously emulate the hardy virtues and rural industry of their adventurous Anglo-Saxon ancestors.

PRODUCT OF MULBERRY LEAVES.

To the Editor of the Farmers' Register.

Stafford, July, 1836.

The cocoonery which you published as mine belongs to the Potomac Silk and Agricultural Company, which was incorporated by the legislature in March, 1836. As the stockholders generally have no experience on the subject of silk-culture, I sign my name individually to communications published, because I am responsible *alone* for the opinions and *facts* set forth in such communications.

I am pleased that you published the statements of Dr. Perrine, because they are calculated to some extent, to counteract the injurious influence of the extravagant and ridiculous statements which have inundated the country for several years past. It is unwise even in speculators to countenance such statements, because they are calculated to lessen the demand for trees, by producing the erroneous impression that they have a very trifling *intrinsic* value. Dr. Perrine's statements, however, I am quite sure are far below the truth. I know from actual experiment that 5000 pounds of foliage can be taken from an acre of land that will produce only fifteen bushels of corn. I came at this result by counting trees (3600 to the acre,) and weighing the foliage from a fair average number. The trees were transplanted, at two and three years old in the spring of 1838, and headed down the following fall.

The account should then stand thus: 5000 lbs. of leaves will produce 25 pounds of silk, worth when well reeled $5 per pound, or in the aggregate $125, from which deduct $2 per pound for rearing the worms and reeling the silk, and $8 per acre for cultivation, the net gain would then be $67 per acre on land that will only give $7 net profit in corn or oats.

That the above named expenses are ample, I know from experience, if the business be conducted with practical hands, and due regard to economy. As the trees get older, if treated properly, they would no doubt yield from 30 to 50 per cent. more.

LAYTON Y. ATKINS.

P. S. Dandolo's statements with respect to varieties of silk-worms are entitled to the highest confidence. In the estimate of profit in silk-culture you perceive that I allow Dr. Perrine's statement as to the quantity of leaves required for one pound of silk, to be correct, although it exceeds numerous actual results in France and Italy. Will you examine and see whether Dandolo or any other foreign writer says any thing about a "two-crop" mammoth?* There may be some honest men who, being themselves deceived, engaged in

* We know of none.—ED.

selling "two-crop" mammoth eggs, but that *all* who are trafficking in mammoth worms and other varieties from the vegetable and animal kingdoms, are "over much righteous," I am slow to believe.

I have just had small parcels of recently deposited eggs of the "mammoth yellow" to hatch, and much larger proportions of new varieties produced by cross fecundation. Now is my time for setting up a *humbug* shop—but all my fair prospects are blighted—my *real* opinion is out and gone, and I have neither ingenuity, nor impudence enough to hide it from public view.

EFFECTS OF LIMING.

To the Editor of the Farmers' Register.

Fairfax county, June 16th, 1839.

My corn which has been made without the use of the plough, is now throwing out the tassel, and is of the blackest green; very little of it is manured, for the land was too remote or precipitous thus to be treated. By the way, I planted two ears of "Chinese tree-corn," upon land well manured and limed; the result will prove it absolutely worthless; and more like a rush than a tree. My wheat is fine when compared with crops made upon the same land without lime. I believe I am within bounds when I say the improvement is from 50 to 100 per cent. My oats *must* make 100 per cent. more than I ever made without lime. My clover is short, but I am cutting it with a view to seed; otherwise I should not cut it. This crop got no root last summer, and the spring was too dry for its growth. Dear old Virginia *must be resuscitated*, and stand forth in *green and gold* among her sisters. The pride of her children gives me warrant of this result.

I can assure you and your readers that the use of plaster of Paris after lime, works strangely and wonderfully. *You* may explain why it is so; for *me*, it is sufficient to see and know that it is so. Where the great father of nature has placed the limit of fertility, when lime, plaster and their produce of vegetable matter is turned back, and reacted upon, time only will show. I shall be greatly disappointed, if the "far west" does not find in the tide-water of Virginia its rival. If I live, I shall make some report to you on the subject. I am amused to see the sharp controversy that is going on in the agricultural papers, about the proper application of manure. My experience of 40 years and more, authorizes me to say, that the difference between ploughing it in, and applying it to the surface is much like that between "*tweedle-dum* and *tweedle-dee*," save that the surface application only takes half, or less than half, of the other. Of course it is not so durable, because of the diminished quantity. Choice however, in the mode of application, with me, is out of the question; for I find that after collecting my spring and fall supplies of oyster shells, and the wood necessary to burn them, I have no choice left; my manure must go out as we can, not as we would. Our timothy grass is bad, unless upon limed land. Upon that it is very good.

I will close this, by remarking that my corn was planted upon a poor field, directly upon the main southern road, and limed for public observation. I have not used plough or coulter in its cultivation. The plough I have long since disused, as a barbarous and inapplicable implement for the cultivation of corn. The coulter, I have, until the present crop, freely used for the early cultivation; this year we had no heavy rain to bake the ground, and it was not used. I cannot speak of the crop, without appearing to speak of my own smartness, which I could not do in good faith to my own convictions; for I assure you, sir, that every day convinces me that I am but an *infant* in the science of agriculture.

LIME.

FIRST TRIALS OF SILK-CULTURE.

For the Farmers' Register.

Farmville, June 25th, 1899.

My attention was first drawn to the silk business by a letter of Dan Bradley, republished in one of the first volumes of the Register, and has ever since been directed steadily to it, although the failure of a mulberry dealer in the spring of '37 to furnish 1000 cuttings purchased in the fall of '36, has thrown me back very much in the business. I hatched, on the 29th and 30th of April, what had been purchased for a fourth of an ounce of the two-crop worm; supposing to be from subsequent estimates, about 3000. They were kept at first in a room, the temperature of which could be very well controlled, ranging during the first age from 70 to 80°. Their first moulting took place the 5th day after that of the hatching. They commenced spinning the 25th of May. A few were lost in the fourth moulting by feeding too plentifully before all had recovered from their torpor, and covering, in the litter, those which were latest in moulting. The spinning apparatus was of *planed* laths, as described in the Register by Mr. T. S. Pleasants. It was evidently too smooth, although eventually probably two-thirds spun among the laths. As they commenced spinning much earlier than was anticipated, the ladders had not been prepared; one was hastily prepared across the middle of each hurdle, and the deficiency supplied with sticks. They did not mount well on either. The cord of the ladders was too small; and they were very torpid and sluggish during the whole spinning season, which continued more than a week. After the first two or three days of their spinning, the weather became wet and cold, and continued so, the thermometer being on one occasion as low as 50°, and generally ranging in the morning from 54 to 58° in the house. They had been removed before spinning to a house where no fire could commonly be maintained, and which was too open for the temperature to be controlled even by a fire. Some became so torpid as to be unable to spin; part of these died and a few passed into the chrysalis state without spinning; most, however, were healthy and made good cocoons, mostly white, a few of straw color. Taken as they came from the laths, including some imperfect cocoons they weighed 378 to the pound. Of the straw colored, taken without selection, 290 made a pound; 240 of some cocoons from the common worm, raised by Capt. Stevens in this neighborhood, weighed a pound. The Messrs. Kings fed 30 to 40,000 this season hatched about the first of May. They think they did not lose 100 by disease. About 3000 were purchased as "mammoth white," the rest as

"two-crop;" 378 cocoons of these mammoth white weighed a pound. The silk is of glossy whiteness, and reels remarkably well, and although they have no pretensions to the character of *mammoth*, the Messrs. Kings think very highly of the variety. The same gentlemen intend feeding another crop this season. On the 14th and 15th of May, I hatched what were purchased as ¼ oz. of mammoth white, and which are evidently the same variety as those of the Messrs. Kings. They commenced spinning the 16th of June, which was Saturday. Sunday night was very cold, and on Monday morning they were very torpid, and I lost a large portion of the crop. Larger cords had been put to the ladders, and the number of ladders increased, and on Saturday and Sunday they mounted very well; but after that time bushes and broom corn were placed on their hurdles. They seemed to give the preference to the broom corn for spinning, and even for mounting, as some ascended by it and spun in the laths. The eggs of this crop were kept in a cellar until the 29th of April, when a few worms were discovered on examining them, and the eggs transferred to the ice-house and kept there until the 15th of May, when they were taken out, and began to hatch in a few hours after they were removed. Whether the sickliness of this crop arose from the treatment of the eggs or from the cold of Sunday night is doubtful. I shall be able to determine this point, however, as I have a crop now feeding from the same stock of eggs, which were kept in the ice-house until the 25th of May, I feared the vitality of the eggs would be destroyed or their health injured by removing them to my ice-house in that state, but could not feed as large a number so early in the season, and was obliged to hazard the experiment. Another crop in the neighborhood, the eggs of which were kept with mine and hatched the same time, shared the same fate. Several other crops have been fed in the neighborhood, and all except the two mentioned have been remarkably healthy.

I intend feeding another crop of about 30,000 from the eggs of my first crop, some of which commenced hatching the 24th of this month. This is my fourth crop this season. The first hatched the 29th of April; second, the 14th of May; the third, the 25th of May; the fourth, from eggs raised this season, on the 24th of June. Ten days is a sufficient interval between the hatchings to prevent the crops from interfering with each other. I would sell a quantity of the eggs of the two-crop worm raised this season, which are now ready for hatching.

Yours respectfully,
SILAS T. BIGLOW.

ON THEORY AND FACTS. TWO-CROP SILK-WORMS.

To the Editor of the Farmers' Register.

A distinguished writer, on the science of chemistry, has said, "imagination which is ever wandering beyond the bounds of truth, joined to self-love, and that self-confidence we are so apt to indulge, prompts us to draw conclusions which are not immediately derived from facts; so that we become, in some measure, interested in deceiving ourselves. Hence, it is by no means surprising, that in the science of physics in general, men have so often formed suppositions, instead of drawing conclusions. These suppositions handed down from one age to another, acquire additional weight from the authorities by which they are supported, till at last they are received even by men of genius as fundamental truths."

The process of reasoning described in the above quotation, has been a fruitful source of error, and for centuries has opposed formidable obstacles to the progress of the arts and sciences; and it may with truth be affirmed, that no art has been so much impeded by such difficulties, in its progress to a high state of improvement, as that of agriculture. It is no uncommon occurrence, for men, having no practical knowledge of agriculture, to assume the chair of the lecturer, and to deliver their lectures to the agricultural community; and if they fail to pursuade the steady, intelligent and industrious farmer, to fall in with their theories, he is charged with either obstinacy or ignorance. Those who write for agricultural journals should carefully distinguish between *theory* and *fact*. They are both useful when each is kept within its appropriate sphere. The propounding of theories, leads to experiments, and by these conducted carefully, facts are ascertained, and error may be rejected, and truth retained and reduced to practice.

I have on hand, a large supply of *theory* on agricultural subjects, and if I were allowed to pour it forth in an uninterrupted stream, yourself and your worthy correspondents would have to give place, and allow me full and quite possession of your columns, till about the 1st of January next. But if I should unfortunately get the scribbling *mania* to this alarming degree, I hope you will use the editor's prerogative, and apply the proper correction.

It is evident from several passages in the Chinese work on the culture of silk, recently published by Mr. Force, that the Chinese are in the habit of eating the chrysalides of silk-worms. For aught I know, they may make a wholesome and palatable dish, equal to the best fried oysters; but I have a sensitive and very rebellious stomach, and as yet have not plucked up sufficient courage to give the chrysalides, either fried, stewed or boiled, a fair trial. It is therefore *certain*, that I shall be in want of corn and potatoes, pigs and poultry, and I hope that you, and some of your experienced correspondents, will continue your kind efforts to teach the art of raising these useful commodities. That they are wholesome and palatable, are facts well established; but the art of producing them has not reached perfection.

I will now proceed to my main subject which should have been done sooner.

In your article on "mammoth silk-worm eggs," you say "the repetition of hatching which has become a fixed quality, in the "two-crop white" silk-worm, and in other kinds known in tropical climates, is doubtless caused by the long continued action of warmth. In Bengal, it is said there are worms producing ten or more successive generations in a year; and it seems from Dr. Perrine's information, that a similar result has already been produced in Cuba." (p. 377 vol. vii.)

In the general views expressed in your article, I concur, but I object to the theory laid down in

the paragraph just quoted. If I believed this to be the true doctrine, I should not regard the "two-crop white," as truly a "two-crop" variety. I believe that in giving two yields each season, it obeys the law stamped upon it by its Creator, and not an accidental habit produced by a warm climate. In some small parcels there might occur an occasional aberration; but the main body of this variety (if kept from mingling with other varieties,) will transmit its distinctive character to the latest generation. In China, they have a worm that moults four times, and gives two crops; and another variety that yields four times; but of the thirteen varieties enumerated, nothing is said about a change of natural habits produced by a variation in climate.—(See Chinese Treatise pp. 96 and 98.)

I once heard of a lot of the common variety (spinning white, orange and pea-green cocoons,) having contracted the habit of hatching two and three times; but this parcel expired by forming cocoons from which the perfect insects never emerged. That the "two-crop white," (the term *white* refers to the color of the cocoon, and not to that of the worm,) will lose the habit of hatching twice by mixing with other varieties, I know from two careful experiments; and if mingled with worms spinning yellow cocoons, the colors will mingle. White worms descend from those that are gray, but if white cocoons are chosen for seed, no other color will be found in the next crop, and so with all other colors. The culturist may select his color and have it perpetuated and unmixed, by selecting cocoons of uniform color. I hold with you, that there is no "two-crop mammoth" in the United States; and until the claimants of such a worm prove it to be really a "two-crop" variety by the experience of ten successive years, I shall remain, as your Fairfax friend, says "Thomas O' Dedimus." By the way, I will say, that I have the highest confidence in "marling" and "liming," because I know that it will conduct those of us that dwell on poor land, into clover to the knees.

We now have theory against theory—let time, and a sufficient number of adequately tried experiments, terminate the conflict.

LAYTON Y. ATKINS.

Stafford co., Va., July 1839.

PROGRESS OF SILK-CULTURE, AND NEW IMPROVEMENTS IN THE MIDDLE STATES.

To the Editor of the Farmers' Register.

During a recent visit to Philadelphia and Burlington, and some other places in the vicinity of those cities, I had an opportunity of observing the state of silk-culture, and of contrasting it with what it was twelve months ago. The advancement has been evident and decided; and the foundation appears to be laid for the general adoption of the business in the contiguous portions of Pennsylvania and New Jersey. In New Jersey especially, the soil is of a quality and composition admirably adapted to the multicaulis. It is light, sandy and deep; not rich, but quick and lively enough to ensure a healthy and rapid growth of the plant, and to furnish foliage of the best kind. There is probably more multicaulis growing in that state, than any other in the union; and almost every person engaged in its culture, whether farmer or shopkeeper, has a lot of worms which he attends with the greatest care. The demand for silk-worms' eggs, particularly the "two-crop," has been and continues to be, very great. They readily command at this time, twenty to twenty five dollars per ounce. One individual near Burlington, who has already raised two considerable crops during the present season, has realized several thousand dollars from the sale of eggs alone. French eggs have also been imported in large numbers; and the whole of last year's stock has gone off at high prices. From these facts, some idea may be formed of the zeal with which the good people of New Jersey have taken hold of the business. In the neighborhood of Philadelphia there are eight or ten cocooneries erected; some of them on quite a large scale. The most noted of these is the Highfield cocoonery at Germantown, belonging to Mr. Physic. Nearly all the readers of agricultural papers must have seen some account of this building, which has been described as a model of its kind. It stands on an elevated situation, overlooking much of the surrounding country. The exterior has a beautiful appearance; and it is obvious that a great deal of money has been expended in fitting it up. It may well be doubted, however, whether it will, in its present state, fully answer the ends for which it was designed. Every thing is crowded to excess, as if the object had been to rear the largest possible number of worms in the smallest space. The shelves are so wide, (not less than five feet,) and so close to each other, and the passages are so narrow, that there must be great difficulty in effecting a perfect ventilation. The dimensions of the room are about 100 by 32 feet; and it is the intention of the proprietor to feed a million and a half of worms as soon as the leaves are large enough. Should he succeed in carrying them through, it will be the greatest triumph that has yet been recorded in the history of silk-culture in this country. At present the multicaulis on the western side of the Delaware are much smaller than they are on the Jersey side. The river forms the boundary between two formations totally different from each other. At Wilmington there is a silk farm and cocoonery belonging to a company, which appears to be under excellent management. They have already fed 400,000 worms on the wild mulberry—a number sufficient to exhaust the foliage to a considerable distance round; but by great exertions they were able to obtain a tolerable supply. Perhaps the largest cocoonery erected for the present year's operations, is that belonging to an incorporated company at Burlington. This ancient city, recently in rather a decaying, certainly not in an improving condition, has put on a new aspect, since its inhabitants have been so extensively engaged in the culture of the multicaulis. From its early adoption of this culture, and the spirit with which it has been prosecuted, it has taken the lead of all other places, and has been able to give the law in every thing pertaining to multicaulis. The stock of the Burlington cocoonery is taken by persons who are growing the trees, each of whom is to furnish his proportion of foliage; the company having no plantation attached to their buildings. The house is two stories high, and 117 feet in length. From the great number of trees grown in the vicinity, and from the judgment and experience of the directors, the most

successful results may be anticipated. In the early part of this month, they commenced with about 150,000 worms, under the immediate care of a sensible and intelligent female, from the silk-growing district of Connecticut. The Messrs. Cheneys, whose cocoonery is situated on the Delaware, about two miles above Burlington, are making preparations to feed silk-worms on an extensive scale, and according to the most approved modes. One of the firm is now in France, and another has very recently returned from that country. They went there for the purpose of inquiring into the improvements which have been made within a few years in the art of rearing worms, by eminent French culturists. They are now introducing into their cocoonery the "improved system" of ventilation and feeding, of which M. D'Arcet is the author. Their fixtures were not completed, but as far as they had been yet able to adopt them, the results were not only cheering, but astonishing. M. D'Arcet's mode of warming and ventilating, is by hot air furnaces placed in the cellar, at each end of the building, by which the external air is heated when necessary, and conveyed through pipes into the feeding room above. An equable temperature is by this means readily preserved, and a continual circulation kept up. The Messrs. Cheneys' furnaces were not set up; and in the mean time they were using a common anthracite stove, fixed in the middle of the room, with a long horizontal pipe for the escape of the smoke. The mercury was kept as near as possible at 75 degrees. They were feeding about 250,000 of the common gray worms, the first hatching of which was on the 30th of June. I saw them on the 6th of July, at which time they had gone through the first moulting, and a few were becoming torpid the second time. The worms were fed on chopped leaves, eighteen times in twenty-four hours, with an interval of a few hours' repose in the middle of the night. Under this forcing system, the worms, after showing general signs of torpor, pass through their moultings and waken up with great uniformity in the course of six or seven hours; and their ordinary term of existence is abridged ten or twelve days. The difference in size between worms of two successive days' hatching would be incredible to those who had not seen it. It will be highly interesting to know the final results of this experiment, which it is hoped will be speedily laid before the public; for a minute diary was kept of their treatment and progress. The greatest danger to be apprehended is from the substitution of the stove for the furnace. The effect of stoves with constant fires, as was the case with theirs, and supplied moreover with anthracite coal, is to decompose the atmosphere to a considerable extent. To visitors, the respiration was difficult and oppressive; but it was not so to the attendants who were constantly in the room. That the system of *heated air* however has been highly successful in France, there can be no doubt. I had the gratification of looking into several French works which Messrs. Cheneys had imported; one of which was a synopsis of the treatment and results of rearing silk-worms on this system, under the following title: "*Tableau synoptique, publié sur les auspices du ministre du commerce et l'agriculture. Education hative aprés les methodes de M. Camille Beauvais et les procédés de ventilation M. D'Arcet.*"* The table has a number of columns; the first shows the ages of the worms and the time of moulting; the second contains drawings, neatly engraved and colored, of the progressive sizes of the worms during each successive day, and also of the cocoons, moths and eggs; another column gives the temperature; another, the number of meals in the 24 hours; another, the weight of food, and so on. Some of the results are as follows: the first moulting is on the 5th day, the second on the 8th day, &c. They began to spin in 24 days, in 30 days the cocoons were all formed, and in 40 days the moths had cut out. Until the first moulting they were fed every hour, or 24 times a day; between the first and second moultings 18 times a day. The number of meals was gradually reduced to 8 times a day in the last age. The progress of Messrs. Cheneys' worms was even more rapid than that indicated by the table. Another work contained a "Description of a healthy cocoonery," by M. D'Arcet, illustrated by numerous plates. It is doubted, however, by many skilful culturists in this country, whether we shall derive any benefit from conducting the "education" of the worm, in such an artificial manner as it is under the improved French system. Our climate, they say, is naturally favorable to the rearing of silk worms; and with good care they begin to spin in from 30 to 32 days. But we have frequently weather of several days duration, especially in May, and even as late as the 1st of July, which is cool, rainy and uncomfortable. At such times the worms are greatly revived by the warmth of a brisk fire. They may do well without it, it is true, but they do better with it. The silk-worm has been so long subjected to artificial treatment, that it is reasonable to suppose it cannot be made *too* artificial, as long as its health and comfort are promoted. But this point will be soon settled by the experiments of our people, who are always attempting to discover the shortest way to attain their ends. At present we are in the infancy of the art. We have no system; and as a community, we have but little practical knowledge. Let every one improve the talent which has been committed to him, and contribute his mite to the general stock; and the happiest effects may be anticipated.

July 20th, 1839.

SEASON, CHINCH-BUG AND CHEAT.

For the Farmers' Register.

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Nelson, July 12th, 1839.

Drought distressing in these parts to all crops. Chinch-bug ravaging the corn which had previously wilted from the former cause. Unless rain come soon, we shall have a bad prospect. By the bye—this year, I think, should settle the cheat controversy finally and forever. Whole fields in this and the county of Buckingham, and perhaps else-

* Synoptical Table, published under the auspices of the Minister of Commerce and Agriculture. Hastened rearing of silk-worms, according to the methods of M. Camille Beauvais, and the plan of vertilation of M. D'Arcet.—Ed.

where, which were reaped last year, were this season covered with *cheat*, which grew thick enough in many cases to be mowed for hay; *not a stalk of wheat in the whole*. The drought of last season prevented the shattered grain from coming up on the stubble fields, until late enough to escape injury from insects or other common causes, and the ground about the roots, being uncultivated and hard, or the branches being too thick-set, and roots shallow, or some other cause, I suppose *strangled* the stalks, cut off the nutriment, and so occasioned the degeneracy of the grain. I am disposed to favor the first theory from the fact of a gentleman in Buckingham having, as I learn, reaped 500 bushels of wheat from a stubble field of last year, which had been much rooted up by hogs during the winter, (and thus received what may have been equivalent to a partial ploughing or harrowing,) while the adjacent field of a neighbor, similarly circumstanced, except that it was untouched, produced nothing but cheat.

I have heretofore been skeptical on this subject, notwithstanding the decided convictions of many very intelligent and credible gentlemen with whom I had conferred on the topic; nay, had joined in the ridicule of an idea apparently so unphilosophical, so directly opposed to the ordinary proceedings of nature; had even thought it impossible, and that any man of sense who could entertain it, must, *quoad hoc*, be under some strange hallucination. But I yield to the evidence of sense, exhibited on so broad a scale as seems to prevent the possibility of imposition.

THE CHINCH-BUGS.

To the Editor of the Farmers' Register.

Dinwiddie, July 18th, 1839.

The chinch-bugs being so destructive last spring amongst our wheat and oat crops, in different parts of the country, I felt well assured our corn fields would be amply supplied with them after harvest. I then concluded the next time I went to Petersburg to become a subscriber to the Farmers' Register, hoping that some of your subscribers would discover something respecting the chinch-bugs that would be of considerable service to me. My calculation as yet has not been realized, but, take it on the whole, I am very much pleased with it. However, so far as the chinch-bugs are concerned, my calculations have been realized beyond my expectations.

A few days before I commenced harvesting, I was walking over one of my corn fields that contained about forty odd acres, I examined something like eight or ten stalks in different directions of the field, and there were some few on every stalk except two. And they have continued to increase ever since in spots, beyond calculation. Where they had their origin, or where they will end, I leave it to others more competent to tell than I am.

As I am quite a young man, and this is the first year that I have settled down to farming, it is not to be presumed that I shall be able to give as correct and satisfactory an account as you and your readers may desire. It appears that the chinch-bugs made their appearance this last time, some four or five years ago, although there was not much complaint until year before last; and they have continued to increase, and make their appearance much sooner in the spring, and have been more destructive every year since. They are small and black, with white wings. In their form they are close and compact, and appear to be of a hardy nature. I think they are pretty much the size of a bed chinch. Whatever kind of crop they get among they stick around it next to the ground; although I have seen them scattered all over the stalks of corn, the blades, and even down into the bud. There were a great many experiments tried last year, and are likewise trying this year to destroy them, but the result of any experiment that has been tried I am not prepared at this time to speak of with any degree of accuracy. I was informed a few days since by one of my neighbors, that those who examined the old fields early last spring discovered there were a great many chinch-bugs about in the broom straw; and I have heard from another source that a farmer on examining into his old corn stalks discovered a great many concealed inside of the stalk. I am disposed to think that if the farmers would all turn in early next spring and burn over the woods and old fields, and likewise burn up the old corn stalks, it would destroy them in a great measure.

It is the opinion of some farmers that if it should turn in wet weather that they will not be as destructive as they otherwise would be. But it is said by others that the wet weather will do no good; I am inclined to think that the opinion of the former is founded on right reasoning. The greatest quantity I ever saw together was in a farmer's wheat patch soon after the wheat was cut. About in spots the grass was completely killed out, and nearly every kind of vegetation was stuck with them.

DENMARK.

IMPORTANCE OF PROPER SELECTION OF SILK-WORMS' EGGS. DIFFERENCE BETWEEN NORTHERN AND SOUTHERN EGGS.

In the last number, we stated that it was of great importance to a successful result in rearing silk-worms to have eggs of a good and healthy stock, and especially of home or southern, in preference to a northern source of supply. Later and numerous facts have so much confirmed that opinion, that we deem it proper to repeat and to endeavor to enforce it.

The recent and new demand for silk-worms' eggs in this region, induced sundry orders to be sent to the north, the point to which our countrymen send for every thing wanted, even when a little search might provide better articles nearer home. The supplies of northern eggs were furnished to Petersburg, and thence to the adjacent country, from sundry different sources, through different channels, and were of different varieties of worms. There were also several small parcels of Virginian eggs, and a larger stock from East Tennessee. Ten ounces of the latter stock hatched prematurely (beginning on April 13th,) and being unsalable, the eggs were given away to all persons who would take them, for trials of rearing.

By this accidental loss to the owner, a most important gain has been made by the public; for, in this mannner, perhaps fifty or more individuals, who would not otherwise have thought of feeding worms, have been induced to make experiments. Nor were these experiments confined to this neighborhood; for the hatching worms were carried to points nearly 100 miles apart. So far as we have heard, (and careful inquiry has been made,) every person who experimented in feeding these worms, and other parcels from home-laid eggs, (with a single exception which will be hereafter named,) was successful in the rearing, unless with such gross neglect, or bad treatment, that success was impossible. And on the other hand, of all the many previously designed, and mostly more careful and better conducted rearings, from northern eggs bought in, or for this town, *not one* has been successful, so far as we have learned; and there are but few that may not be considered equivalent to total failure. The great difference has been in general if not universal healthiness and hardiness of worms of southern stock, and general and sometimes universal feebleness, disease, and finally death, of the northern broods. Such likewise have been the general results elsewhere that we have heard from, but with some few exceptions of healthy and good products from particular feedings of northern worms.

In the various cases under our own observation, or derived from neighboring gentlemen with whom we have frequent intercourse, these results have been the more striking, because in some instances the same individual was eminently successful with worms of southern stock, and as eminently unsuccessful with northern. Sometimes these different results were found in different broods hatched at the same time, kept in the same apartment, and throughout treated alike. We could state particulars of many such experiments, on the most unquestionable authority, which would fully sustain these general statements; but it would be an unnecessary extension of this article, and is not called for, unless the statements should be questioned. Upon the whole, it may be safely asserted, that if the rearings hereabout had been made altogether, (as they were mostly,) from northern eggs, and if there had been no other experience to show different results, that all confidence in the culture would have been lost, and every new beginner would have been discouraged and disgusted, and probably would have abandoned all thought of prosecuting the business. But luckily, there were enough, though smaller and less careful trials, from home-raised stock, to show entirely different and highly successful results; and more especially was it fortunate for the cause of silk-culture, that the accidental hatching of what seems to be the most hardy and valuable stock, should have spread that stock, and established its value, through an extensive region of our country.

One of the most careful and best provided of all the new culturists, T. S. Pleasants of Bellona, was one of those who obtained, and reared with entire success, some of these southern eggs; and he has since lost totally, by disease, the worms of three ounces of eggs, ("mammoth-white,") of northern product. In communicating this and other such facts to us, and stating his concurrence in our opinion as to the general worthlessness of eggs received here from the north, he expresses his astonishment at the strangeness of the facts, and asks whether the change and difference of climate can produce the effects. We think not. Our opinion is, as before stated, that to have a healthy brood of worms, it is essential that the parent stock should have been healthy; and we infer that the northern eggs, sent here, produce unhealthy worms, not *merely* because they come from the north, but because they are generally also the product of feeble or diseased parent stocks. Deeming the climate of Virginia to be much better for silk-worms than that of the states north of Maryland, we should expect that eggs of the same kind, and the broods treated alike, would produce a better progeny, and better eggs from them, here than there. But that would be but a trivial circumstance compared to others which probably are of very extensive if not general operation. Every rearing of worms, even if among the most healthy and productive in general, has many individuals comparatively feeble, which spin cocoons of little or no value, and scarcely worth the attempting to reel. *Being fit for nothing else*, it is probable that these worst cocoons are usually selected *to furnish eggs for sale;* and that to this mode of selection the southern purchasers from northern dealers are indebted for the general worthlessness of the eggs obtained. And if the *worst stock* is chosen to furnish eggs, we may be supplied with worthless eggs even near home, without resorting to the north. Even if such selection of the worst and most diseased has not been actually made by design, it is certain that the recent and present great demand for eggs, has caused the worst as well as the best of every brood to be suffered to produce eggs for market; and thus if a parcel of eggs contained any that were from good and suitable stock, it also necessarily contained a large proportion of the worst description.

The applications of these facts is obvious, and should by no means be neglected by any one who hopes for success. After obtaining a first stock,

as carefully as may be, every one should raise his own eggs, and only from the best cocoons, and the most healthy of the worms. And those who have to buy, ought if possible to obtain their eggs from those on whom they can rely for some care and honesty in the manner of producing eggs for sale, and for truth in the characters and descriptions reported.

A single exception was named above to the otherwise universal healthiness and success of worms of southern origin. These were from eggs of one particular rearing of 1838. Of a portion of these we lost every one, (by the contagious disease called "the yellows,") while the worms of two other kinds, (also both southern,) in the same house, did as well as very bad arrangements and rough treatment permitted. Three other persons who were supplied with eggs from that same stock, also lost every one of their worms. These exceptions, so far as they go, seem to confirm the opinion of such results being caused by the eggs being obtained from a diseased stock. For though less likely to occur, a southern stock may be as feeble, or diseased, and as unfit to breed from, as any of the northern.

But even when there is not much disease exhibited in a brood, and when the rearing, if taken alone, might be deemed quite successful, we have found much difference in the *time* of feeding worms of southern and northern origin; and a few days added to the time required for rearing, is alone a very serious objection, on account of the greater expense of labor, of food, and the longer exposure to the risk of injury. We have just finished the rearing of four small broods, for experiment and comparison, of the following different kinds of silk-worms.

No. 1. Southern. Large gray worms, producing orange cocoons, a *second hatching*, from the eggs of one female, laid this season, and of the kind which had hatched first prematurely in April.

No. 2. Southern. Smaller white worms, producing sulphur-colored cocoons, also a second hatching of this season.

No. 3. Northern. "Yellow mammoth."

No. 4. Northern. "Pea-nut" kind.

All were hatched from the 18th to the 20th of June; and the worms were kept on the same table, fed and attended to by the same persons, and treated throughout with equal care; and the results were as follows:

The two southern kinds did very well; some few (not exceeding 2 per cent.,) in their latter stages appeared yellowish and diseased, and were thrown away as soon as observed, for fear of infecting a highly prized stock; and one or two others of each parcel died after beginning to spin. The earliest of the large gray, (No. 1,) began to spin at 23 days old—and the last on the 29th. The smaller sulphur-colored (No. 2,) were about a day later in beginning, and the most sluggish of them were more behind the slowest of the gray. The "mammoth" worms (No. 3,) were not only slower in progress, but smaller at the same times, than the southern gray worms (No. 1,) though they finally reached about the same size. Three-fourths of their number were thrown away, as diseased. The first beginning of them to spin was at 29 days old. The "pea-nut" eggs (No. 4,) were *known* to have been of a healthy stock, (raised by S. Whitmarsh, esq., Massachusetts,) and the parent worms had been properly selected for breeding; and from part of the same eggs, T. S. Pleasants at Bellona, has raised this season, and has done well. In our smaller trial, though the losses by disease were very considerable, still the rearing may be considered successful as to final product. But these were six days later in beginning to form cocoons than the large gray worms, (No. 1,) and at 29 days old, the first were beginning to spin, with the latest of the others. This is the only case *known with certainty* of northern eggs of best quality, and of a good kind.

The first moths from the cocoons of the large gray worms, came out on the 24th of July, (the 37th day from the hatching of the eggs,) and therefore, from the 13th of April, to July 25th, when the first of the third were laid, there were three successions of eggs in existence, within 103 days. Of this parcel (No. 1,) the eggs were not counted, but it is believed that all hatched, and that the after losses did not exceed, if they reached, 4 per cent. The product was 204 cocoons, nearly all very firm, and of excellent quality. Of the "pea-nut" eggs, 1297 by actual count, about 1100 hatched, and all made from them were 485 good cocoons, and 57 soft and imperfect—showing a loss by disease of about 50 per cent., of the hatching.

The greater slowness of growth of the "pea-nut" kind we expect to diminish in our climate, and probably may disappear by another year; and in all other respects they seem to be an excellent kind, inferior only, as we believe from our little experience, to the hardy gray worm. The cocoons of this second brood of the latter are firmer and better than those of the first hatching. If the eggs of these should again hatch, making three successive rearings from the same stock in a year, there will be good reason to believe that this quality of repetition in hatching will have become a fixed quality, and thereby a new two-crop variety produced. The pea-nut cocoons are remarkably firm. The sulphur colored (No. 1,) we would reject, (even if it *has* become a two-crop worm,) on account of its small size. The "yellow-mammoth," if to be judged by the result of this rearing, we consider as feeble, unproductive, and worthless, and not possessing in

any considerable degree even the very doubtful merit of unusually large size.

Since the above was in type, we have seen in Morris's Silk Farmer of July 22nd, that the current price in Philadelphia of silk-worms' eggs was "$20 the ounce, on the muslin, equal to $40 the ounce of net eggs." Sundry persons in and near this town have raised eggs, and have them for sale, and have not yet sold for more than at $5 the ounce (actual and honest weight,) for one-crop, and $10 for two-crop eggs. The latter kind can scarcely be prevented from hatching in summer, and therefore have already been mostly lost.

MUD FOR MANURE.

From the Maine Farmer.

Messrs. Editors:—A few years since I read a communication from the 'New England Farmer' on the subject of the leaves of trees as a manure. It was from the pen of a good farmer who, it would seem, employed every method within his power to increase the quantity of his manure by artificial means. This writer stated that a very few loads of the leaves of trees, mixed each year with the manure of the barn yard, is excellent, but that large quantities is positively injurious to vegetation. I think I can state one case which may go to prove the correctness of the statements made by this writer. I have a piece of land which has been for many years improved as a garden. A brook which formerly ran through this garden, but which has changed the direction of its current left a copious deposit of mud, or the matter of decayed leaves of trees.

A superficial observer on examination of the soil of this garden would assert at once that an abundant crop of almost any kind could be raised upon the same. Three years ago I manured this garden with good barn yard manure, at the rate of 80 loads per acre. I expected that the succeeding crops would be very great, but I was disappointed: my crops in my other fields, where the soil did not appear to contain one half of the fertility of this garden, were much greater. I concluded that my garden had been so long in tillage that it was rendered unproductive on that account, and the last year I seeded the same down to grass. I shall continue this garden in grass a year or two, when I shall convert it again to tillage. I suspect that the chief cause of the infertility of this garden is owing to an excess of vegetable matter in the soil, or as the writer aforesaid would have it, there is too much of the matter of decayed leaves of trees brought on by this brook. Now shall I seek the proper remedy? Lime undoubtedly is the very thing wanted in this case. When I break up this garden again I shall sow upon the same a liberal portion of good lime.

When the communication of the writer aforesaid appeared, the editor of the 'N. E. Farmer,' recommended to him the use of lime mixed with the leaves in the form of compost. Some kinds of mud will make a most excellent manure without being mixed with lime; but I think that farmers who practice hauling large quantities of muck from swamps and other places, where the materials are composed wholly or in part, of the remains of decayed leaves of trees, &c., should mix lime in abundance with the same previous to applying it to the soil. Lime will correct all ill-effects on land that may have been injured by an application of this kind of manure. R.

Rumford, May, 1839.

CHINCH-BUG.

For the Farmers' Register.

Surry, July 10th, 1839.

* * * * * * * *

The chinch-bug is on every farm that I have seen or heard from in the county. It is quite amusing to hear of the remedies used to destroy them; some tar their corn, others oil it, others again try to scald them to death with hot water. It is quite unnecessary to state that none of the remedies do the least good. This year on farms where they have just made their *debut* the corn crop will be cut short at least a fourth, and for the next year I believe many would be willing to compromise and take half a crop. You have no idea what an awful sensation they have produced among the farmers; very many are frightened almost unto death, imagining that a famine with all its horrible consequences is almost at their threshold. From their immense prolificity they will be enabled to do great damage. * * * * *

MONTHLY COMMERCIAL REPORT.

For the Farmers' Register.

The news from England to the 6th of this month is very unfavorable. The pressure for money was great, and the exchanges between England and the continent were so much against the former, as to continue the drain of specie which had existed for some months previously, and embarrassed all commercial operations. The demand for British manufactures was inadequate to meet the sums required to pay for grain and other commodities imported, and the deficiency had to be made up in gold and silver. The price of wheat had, however, declined so much on an average as to increase the duty on flour from one shilling to eight shillings per barrel; the prospects of the growing crops were favorable, and therefore, a reflux of specie may ere long be anticipated. Meanwhile, however, much commercial distress is to be apprehended. The imports of cotton into the kingdom were 717,000 bales against 973,000 to same date in 1838; but such had been the diminished consumption, that only 432,000 bales had been required against 626,000 in the first six months of the respective years; and at that rate, the stock on hand was more than sufficient to supply the demand for the remainder of the present year. So great a change was not anticipated, and heavy losses are like to be the result.

It is pretty well ascertained that the receipts in the various markets of the U. States in 1839 will be about 1,350,000 against 1,800,000 bales in 1838; but notwithstanding this great deficiency, prices cannot be supported, and indeed the demand has entirely ceased, except for domestic consumption. The nominal prices are 12½ to 14½ cents.

The appearance of the growing crop is favorable in almost every portion of the country where it is cultivated.

The prices of wheat and flour have been gradually declining for some months past. The recent sales of flour have been at $5 50, and the stock of old which remains in the interior (say in the western states) is larger than usual at this season. In every part of the country, except the middle region of Virginia and North Carolina, the harvest is said to be the most abundant. Some weeks ago a few crops were sold, deliverable in this month, at $1 35, but recent contracts have been at lower rates; ranging down to 105 or 110 cents, for delivery some three or four weeks hence. That which is now brought to market for sale, commands 110 to 115 cents, if good; but there is much inferior in the crop. Unless some new and extensive demand arises, prices will be low throughout the year. The crop of oats is very abundant, and the prospects for corn were never more favorable.

Tobacco of good quality has maintained its price, while inferior descriptions have declined; the range of sales is from $4 50 to $18 50; generally $6 50 to $13 50. The inspections in Virginia will be about 27,000 hhds. against 45,000 last season, and the deficiency in other states will be in as great a proportion. The quantity manufactured at home, is also much diminished. The growing crop in all parts of the country is very promising, and will no doubt prove abundant.

Internal exchanges continue much deranged, particularly between the western and Atlantic states, with a prospect of getting worse.

Exchange on England 10 per cent. premium.

X.

July 25, 1839.

SEASON AND CROPS.

Notwithstanding the partial but yet very destructive depredations of the Hessian fly and chinch-bug on the wheat crops of eastern Virginia—the still continued ravages of the latter insect, removed to the crops of corn—the unusual operation of a severe spring drought—and the recent drought which is beginning to operate injuriously—and though all farmers have suffered more or less, and some greatly, from one or more of these inflictions—still, on the whole, there has never been known a year of more genial and bounteous seasons, nor one when the general prospect for all the different crops was so good. In lower Virginia, rain has at no time been so long withheld as to cause lasting injury to the growing crops—nor has any material harm been done by the unusual frequency and abundance of rain. Drought recently and generally prevailed, and threatened a disastrous change to the before luxuriant growth of corn; but the danger has been partially averted by a most bountiful rain which fell on the 24th, though it was of very limited extent; and, as is usually the consequence, they whose crops received no sufficient share of that blessing, (and we are among the number,) may hope for their turn in the course of a few days. The general distribution of a good rain now, or very soon, will secure very good average crops of corn and tobacco throughout eastern Virginia.

July 26*th* 1839.

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